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# Principles of Surgical Nursing

A Guide to Modern  
Surgical Technic

By

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*With 255 Illustrations*

Philadelphia and London

W. B. Saunders Company

1918

229149

W 9

161

W 28 - p

1918

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MAR 13 1918

PRINTED IN AMERICA

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*Dedicated*  
TO THE  
SUPERINTENDENTS AND GRADUATE NURSES  
OF  
BUTTERWORTH HOSPITAL  
THE AUTHOR UTILIZES THIS MEANS OF EXPRESSING  
HIS APPRECIATION FOR THEIR COÖPERATIVE  
EFFORT IN HIS WORK IN THAT  
INSTITUTION





## PREFACE

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IN presenting this volume to the nursing and hospital world, I do so with some trepidation. I am not so fatuous as to believe I am imparting information to such a degree as will enable the student or graduate nurse to gain possession of all that is requisite for a nurse engaged in surgical nursing. The foremost thought has been to impart essential basic principles that will enable a nurse to acquire a reliable fundamental knowledge. Possessed of facts and conversant with their administrative principles, the attainment of perfection will be readily acquired by conscientious work, enlarged experience, collateral reading, and study.

With but one or two exceptions I have purposely omitted all discussion of the literature devoted to surgical nursing. The subject matter may in places reflect previous expressions and opinions, but upon the whole the text is based upon the author's personal conclusions and experiences, and the views that have been acquired by perusal of the surgical literature which has appeared from time to time in current literature and proven satisfactory in our operative work.

Throughout the presentation of this entire subject my endeavor has been to impart facts briefly and concisely, so that the instruction would not be lost in a maze of descriptive and lengthy text. Unusual, obsolete, and unimportant methods have been purposely omitted in an effort to present the primary and pertinent points. The sole purpose has been to describe recognized principles of technic, accepted plans of procedure and treatment as they exist in present-day practice of surgery and surgical nursing. To advance all the viewpoints and methods of surgeons and instructors of nurses would be impracticable. Instead, I have endeavored to present practical methods that would be applicable in the majority of instances.

These explanations are not offered as apologies or to refute possible and probably justifiable criticism. They are recorded that the reader may understand the policy and plan pursued.

In addition to the text I have resorted to illustrative features planned not only to elucidate the text but to serve as teaching illustrations. In their preparation studious attention has been given to their detailed features.

I am indebted to the photographic artist, my hospital and nurse friends, and to my editorial assistants for their valuable aid in producing the illustrations, indexing, correction of manuscript, and proof reading.

To the reader and student, I express the hope that this volume will serve two purposes: First, the presentation of guiding principles of surgical nursing technic of today; second, to stimulate a desire for further knowledge of the subject, thereby inducing the nurse to devote a little time each day to research and study. By so doing, she will increase her ability as a necessary and potent factor in the surgical clinic. The capable, dependable surgical nurse receives the esteem, commendation, and trust of both surgeon and patient.

FREDERICK C. WARNSHUIS.

GRAND RAPIDS, MICHIGAN,  
*February, 1918.*

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# SURGICAL NURSING

## CHAPTER I

### FOREWORD

The recovery of a patient undergoing an operation is dependent to a large extent upon the technique that is employed and observed during the entire surgical procedure. It is by reason of the high development of present-day surgical technique that many of the operations now undertaken result in a low mortality, whereas, the same operations a few years ago either produced a high mortality or were not attempted. Furthermore, many procedures are now possible which formerly were not to be considered, because a fatal ending invariably resulted by reason of infection.

The perfection of the technique is dependent upon two groups of individuals—the surgeon and his assistants, and the surgical nurses. The training of either group determines the character of the surgical procedure, causing it to be all that it should be or but an inferior and defective substitute. I do not believe that it is necessary to advance a single argument to substantiate the statement that every operation should reveal a rigid observance of modern surgical technique—the chain of asepsis should be kept intact in every link. Then, and then only, may we experience the satisfaction of knowing, no matter what the result, that our duty has been faithfully performed. Then, and then only, may we hope or expect to have our efforts attended with end-results that justify present-day statistics.

The constantly changing methods of operative interference, occasioned by the investigations, studies, and experiments of surgeons, carry with them new refinements and the development of modern surgical principles that must be observed. What was considered essential but a

few months ago, may today be classed as obsolete and cast aside. What a nurse was taught during her days of training, in many instances, may, at present, be discarded. In view of this fact, it is imperative that a nurse keep abreast of the times and put forth such efforts as will enable her to become conversant with the progress being made in surgical technique, that she may apply the approved methods in her daily work. It will be my purpose to impart an understanding and a working knowledge of the guiding principles of present-day surgical nursing. While I realize that, in a measure, they will reflect a personal viewpoint, they will be based on present-day surgical procedures that have proved reliable in the practice of numerous surgeons.

In the end, the nurse will, I trust, have gained a clear insight into the progress that is being made and will be enabled to apply any new knowledge she may gain so that, no matter how well or indifferently the surgeon may perform his part, she will have the personal satisfaction of knowing that her duties were performed in accordance with accepted principles.

### SURGICAL NURSING OUTLINE

The work that is to be done in preparing for and during an operation—which duty is consigned to the surgical nurse—may be divided into the following stages or steps:

#### 1. THE PREPARATION OF THE OPERATING ROOM

- |                            |                                  |
|----------------------------|----------------------------------|
| (a) Selection of the room. | (f) Supplies.                    |
| (b) How to clean it.       | (g) Instruments.                 |
| (c) Furniture required.    | (h) Final preparation.           |
| (d) Utensils.              | (i) Setting up.                  |
| (e) Solutions.             | (j) Dismantling after operation. |

#### 2. THE PREPARATION AND STERILIZATION OF THE HANDS

- |  |  |
|--|--|
| (a) Consideration of wearing apparel, etc. | (d) Precautions.                       |
| (b) Solutions used in scrubbing.           | (e) Preparation and wearing of gloves. |
| (c) Methods of scrubbing.                  | (f) Refinement of technique.           |

#### 3. THE PREPARATION OF THE PATIENT

- |   |  |
|---|--|
| (a) Physical or constitutional—general. | (b) Local or operative field—the several methods as demanded by the nature of the operation. |
|---|--|



## 4. THE SURGEON AND HIS ASSISTANTS

- |                           |   |
|---------------------------|---|
| (a) Orders.               | (e) Service entitled to.                  |
| (b) Instruments.          | (f) Nurses' duties during operative work. |
| (c) Scrubbing.            | (g) Post-operative nursing.               |
| (d) Gowns and headpieces. |   |

## 5. THE OPERATION

- |   |   |
|---|---|
| (a) Positions of patient on the table.  | (d) Draping the patient.                      |
| (b) The anesthetic.                     | (e) Duties during the steps of the operation. |
| (c) The final preparation of the field. |   |

## 6. POST-OPERATIVE NURSING

A consideration of the duty of the nurse and the things that require her watchfulness and alertness.  
Surgical chart.

## 7. POST-OPERATIVE EMERGENCIES

The emergencies that may arise and the treatment that a nurse may institute before the surgeon's arrival.

## 8. THE CARE OF OPERATIVE WOUNDS

A discussion of the course that a wound may take and how it may be best treated.

It will be my purpose to develop these steps in the work and duty of a surgical nurse by giving essential details and facts and avoiding all semblance of verbosity. Whenever there may be a question of the preferable method, several methods will be given in order that the nurse may be conversant with those most frequently employed. At times, I shall advance the method that my personal inclination may fancy or approve. When advisable, however, the opinions of others will be quoted. In all our discussions I shall endeavor to bear in mind the possible surroundings that may exist and indicate where exceptions may or must be made.

With this specific introduction, we dispense with further generalities and devote ourselves to the consideration of the first step.

## CHAPTER II

### PREPARATION OF THE ROOM AND ITS EQUIPMENT IN A PRIVATE HOUSE

Hospital architects—these specialists in the architect's profession have been called forth by the development of our modern hospital—in planning the operating rooms for a new and modern hospital bear in mind, while so doing, that the following essentials are deemed imperative for an operating room:

1. An abundance of light; absence of the sun's glare; preferably, a northern light.
2. A room so located as to be distant from extraneous or distracting noise that may arise from street traffic, adjacent corridors, elevators, and visitors.
3. An abundant supply of pure air, free from dust and admitted without drafts.

As these essentials are deemed important in institutional work, securing like surroundings should be accomplished, in so far as possible, whenever an operation is planned in a private home and a surgical nurse is sent to make these preparations. Therefore, in selecting a room in a home, the nurse must not be unmindful of these requirements. A careful inspection of the residence may often reveal what, at first glance, might have been considered impossible for the satisfactory arrangement of an operating room.

The first requirement of an operation in a private home is a room that is distant from the noise of the street traffic and hidden from the idle gaze of inquisitive neighbors. It should have at least two, and preferably three, windows through which the direct sunlight may be excluded and still not deprive the room of sufficient light or prevent proper ventilation. Should the operative work be of such an emergent nature as to necessitate its performance at night, then the natural lighting of the room is to be ignored and attention directed toward securing the best artificial lighting. It is unusual to secure a room so wired as to give a sufficient amount of artificial light, and one's chief consideration should then be a location close to several sockets to which the light cords of surgeon's lamps may be attached.

Most surgeons have equipped themselves with portable lights for night work. In homes that are without modern lighting conveniences, surgeon's lamps, which may be attached to the storage batteries of their automobiles or to small dry cells, will undoubtedly accompany the kit that is sent to the patient's home. There is little excuse nowadays for requiring people to hold lamps and candles during an operation. Such practice is relegated to the past.

In selecting a room a nurse should always bear in mind what the requirements of the operation will be. Many steps may be saved if the room selected is located near a bathroom or water supply and a range or stove. Impossible as it often is to find a room that possesses all these desirable features, one must attempt to select one that has at least a good light and air supply; it should also be of reasonable size, so that the surgeon and his assistants may not be compelled to do the work in cramped quarters. All other features must be sacrificed to these requirements.

The room selected, the attention of the nurse will then be directed to its preparation. Its extent will be determined by the time that remains at her disposal, and whether or not the operation for which she is preparing is one of an emergent nature. If twenty-four hours or more are allotted her for this preparation, she will have an abundance of time to accomplish an effective technique.

The preparation begins with superintending the removal of all the furniture, pictures, drapes, curtains, and rugs or carpets. The room having thus been wholly dismantled by members of the family or servants, the nurse should request that the walls and mouldings be cleansed from any dust that may have accumulated upon or behind them, and that the wood-work, windows, and floors be washed with warm water and soap. In brief the room is to be given a most thorough cleaning. The foregoing steps having been performed, it is then that the nurse undertakes the direct work of final preparation.

In order that this final preparation may be methodically and effectively worked out, I deem it wise to divide the procedure into seven stages or steps:

*First Step.*—The glass in the windows is to be covered with thin, white

tissue paper held in place with ordinary flour paste. This aids greatly in shutting out any glaring light and serves also to obstruct the view of the room from without. In the event that tissue paper is not available, ordinary newspapers may be used.

*Second Step.*—The lower third or half of the window casings are covered

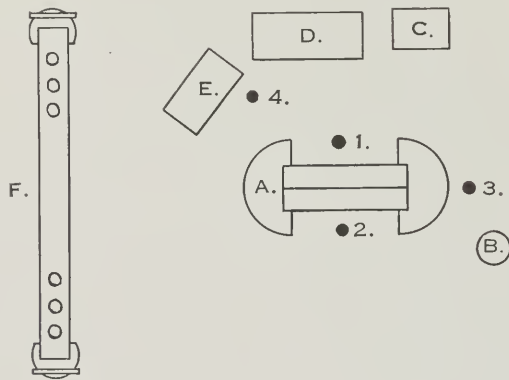


FIG. 1.—THE ARRANGEMENT OF A ROOM FOR OPERATION.—(Schematic.)

A. Dining table arranged for use as an operating table. B. Small table for anesthetist's supplies. C. Table to contain unopened sterile supplies. D. Table with sterile supplies—sponges, sutures, and needles. E. Table for instruments. F. Board resting on two chairs to hold scrub basins, soap, brushes, solutions, and pitchers of sterile water. 1. Surgeon. 2. Assistant. 3. Anesthetist. 4. Clean nurse.

with a freshly laundered white sheet, maintained in place by tacks so driven as not to mar the woodwork. The object of thus draping the window is to permit the lower sash to be partly raised, if necessary, during the operation and yet prevent dust-laden drafts from blowing in upon the sterile supplies, instruments, or operative field.

*Third Step.*—Clean sheets are to be tacked or hung around the walls of the room, reaching from the floor to a height of four or five feet (Fig. 2).

*Fourth Step.*—The floor is to be mopped with a solution of bichlorid of mercury in the strength of 1 in 500 or with lysol.

*Fifth Step.*—The floor is to be covered with sheets, tacked in a sufficient number of places to hold them securely in place and prevent anyone tripping. These sheets are temporarily covered with a loose sheet or



FIG. 2.—ROOM IN PRIVATE HOUSE ARRANGED FOR OPERATION.

The walls are hung with sheets, the tables are draped with sterile sheets, the window prepared by tissue paper pasted over and a sheet tacked over the lower third, the floors are covered with sheets, and the table is padded ready for a folded blanket at the foot and the rubber sheeting and sterile covers.

newspapers to prevent soiling the lower sheet while the remaining supplies and needed furniture are being carried in.

*Sixth Step.*—Suitable tables will be required for the patient, the instruments, and the supplies. If these are not sent by the surgeon they are to be selected from the furniture in the home. After they have been thoroughly cleaned, they are wiped off with a cloth wrung out frequently in a

1 in 500 solution of bichlorid, carried into the room, and arranged as shown in Fig. 1, or according to the operating surgeon's preference.

*Seventh Step.*—The windows should be closed and locked, and the openings between the sash and frame sealed with ordinary surgeon's adhesive plaster. A sufficient number of formaldehyde fumigators should be placed in tin pans and lighted, the door closed and locked, and its key-hole and margins sealed with adhesive plaster, thus subjecting the room to a thorough fumigation.

The room may then be considered as prepared, and no one should be permitted to enter it until the nurse undertakes the final preparation for the actual operative work. By this method you will secure as ideal an operating room as is possible in a private home. True, it demands a vast amount of work, but this should not be begrudged if it advances the safety of the patient to a higher degree. We admit that in emergencies it will often be impossible to subject a room to such a thorough preparation, and necessity will compel a compromise. In this event, the nurse must be competent to carry out the essentials in so far as the time at her disposal permits. Reasonable security may be attained if, after the furniture is removed, the floor be covered with sheets moistened in a solution of bichlorid of mercury of 1 in 500 strength. The lower sash of the windows should be covered with sheets dampened in the same antiseptic solution. Time may also be found for a maid to dust the woodwork with a bichlorid moistened cloth. Your individual tact and executive ability will enable you to utilize the needed safeguards in emergency home operations.

With the completion of these duties the nurse has still more work to perform before the preparation of the room is complete. These duties are to be performed in another part of the home and pertain to the utensils and water supply that will be demanded for expeditious operative work.

#### UTENSILS

In addition to the surgical supplies, instruments and lighting apparatus, which will be sent by the surgeon in sterile containers from the hospital, certain utensils and water must be provided in a manner replete with surgical thoroughness. These consist of:



Four hand basins, granite or porcelain, for scrubbing.  
 Two hand basins, granite or porcelain, for hand solutions.  
 Three pitchers for sterile water and saline solutions.  
 Two enamel basins for sterile table for alcohol and saline.  
 Three cups or glasses for alcohol, iodine, and carbolic acid.  
 Ten gallons hot sterile water.  
 Ten gallons cooled sterile water.  
 One foot tub for soiled sponges, used solutions, etc.

The hand basins, in fact all the basins, pitchers, cups, or glasses, are to be cleansed, rinsed off, and then boiled in a boiler for at least thirty minutes, after which they are to be submerged in a 1 in 500 bichlorid solution and permitted to remain there until needed. A suitable storing container for the bichlorid solution may be found in a wooden tub; do not use a galvanized tub on account of the chemical action of the mercury. The water in which they are boiled may be used to make the bichlorid solution. They may also be left in their original boiler and extra handling avoided.

When these utensils are finally needed, they are taken out of their container by means of a sterile forceps and thoroughly rinsed with sterile water. They are then ready for use but must be handled under all sterile precautions to prevent rendering them unsterile.

**Sterile Water.**—Provision should always be made for an abundance of sterile water. It is secured by boiling for at least thirty minutes. It should be stored in sterile pitchers covered with sterile towels. Just preceding and during the operation there should be a boiler of hot sterile water on the stove. A quantity of cool sterile water should be held in reserve.

**Saline Solution.**—The following method of preparing the saline solution, or normal saline, is in general use:

1. Thoroughly clean a large utensil in which to boil the solution and the pitcher or bottles for storing the solution.
2. Fill this utensil nearly full of water and, after placing the cleaned pitcher or bottles in the utensil, cover, and boil briskly for thirty minutes.
3. While these are boiling add two small teaspoons of table salt to a quart of water and filter the mixture through filter paper or absorbent cotton.

4. Remove the pitcher or bottles from the boiling water, leaving them filled with the sterile water in which they were boiled. Pour the remaining water out of the utensil.

5. Pour the filtered salt solution into the same utensil, cover, and boil for thirty minutes. Then add enough sterile (boiled) water to supply the quantity lost by evaporation, so that you will have a full quart.

6. Pour the solution into the sterile pitcher after pouring out the sterile water it contained; cover with a sterile towel tied over the pitcher.

7. If the solution is to be kept for future use pour it into the bottles, after emptying the boiled water out of them.

8. Cork the bottles with plugs of cotton batting (not absorbent cotton) that have been sterilized by baking until brown.

If the solution is not to be used the day it is sterilized, sterilize it twenty minutes for three consecutive days. This "fractional sterilization" assures destruction of bacteria that may have developed from spores not killed by the first and second sterilization.

The faithful performance of the foregoing tasks will witness the completion of the first half of the preparation of the room on the day before the operation. The preparation of sterile water may be omitted until the morning of the operation.

#### THE FINAL PREPARATION OF THE ROOM—"SETTING-UP"

On the day upon which the operation is to be performed, the room, prepared according to the suggestions laid down, should be thoroughly aired for a sufficient length of time (four to six hours) to remove all traces of the formaldehyde fumes. The error must not be committed whereby an insufficient amount of time is allotted for this purpose. It is extremely uncomfortable, and at times impossible, to work in a room whose atmosphere is laden with the irritating fumes of formaldehyde. Therefore, allow time for their complete removal by sufficient airing. While so doing, dust may be prevented from entering through the windows by covering the entire window frame with a sheet fastened to the top of the frame.

The room having been thus subjected to a complete airing, and the hour for the operation but briefly distant, the final steps of preparing the



room, or "setting-up," as it is commonly termed, are rapidly executed in an orderly, definite, and thorough manner.

The woodwork should receive a final dusting with a cloth dampened in bichlorid. The tables and stands are to be gone over in like manner. The temporary sheet, which was placed over the permanent sheet tacked to the floor, is removed, and the permanent sheet is moistened with a solution of bichlorid.

The operating table is to be covered with a clean flannel blanket of sufficient thickness to be comfortable. Patients, for months after, vividly

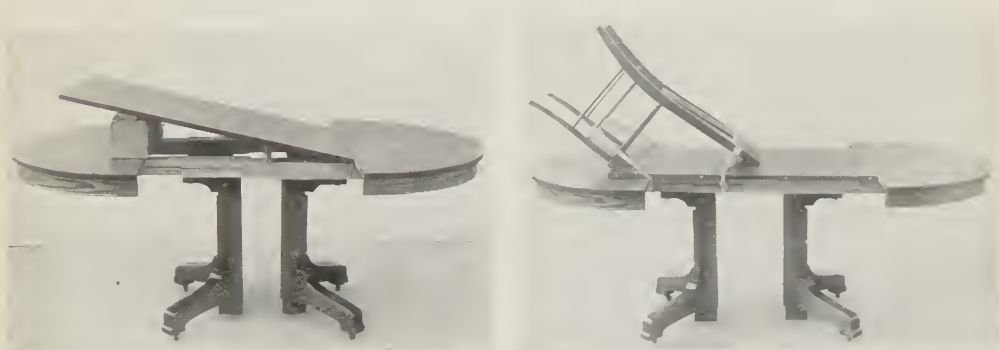


FIG. 3.—TWO ARRANGEMENTS OF DINING TABLE TO SECURE TRENDLENBURG POSITION. In both instances the blanket, rubber sheeting, and clean sheet are placed over the inclined boards or chair and the patient's knees so fastened as to prevent sliding.

recall being placed upon a hard and uncomfortable table. This unpleasant recollection may be prevented if the nurse will but take the precaution to secure ample padding with blankets. Over these blankets is spread rubber sheeting, which in turn must be covered by a clean sheet. A small pillow should be provided. In a subsequent chapter I shall fully describe the several positions that are required for different operations. While discussing the final preparation of the table, however, it may be well to mention briefly one or two methods whereby one of the most common positions—the Trendelenburg—may be arranged.

**Trendelenburg Position.**—This position may be secured by placing at the foot of the table a block of wood of sufficient weight and thickness to secure the desired elevation of the hips. Over or on this block there are placed two leaves of the table, securely fastened as illustrated in Fig. 3,

and the padding, rubber sheeting, and sheet should be placed over these inclined table leaves.

The position may also be secured by the use of a chair turned upside down and securely bound in place. A Kelly pad is placed as the nature and character of the operation will indicate.

#### THE ANESTHETIST'S TABLE

The anesthetist's table may be any small table or stand and is placed as indicated in Fig. 1. On it should be arranged the following articles:

Four cans, quarter pound, anesthetic ether.  
Bottle chloroform, four ounces.  
Jar or tube sterile vaseline.  
Tongue forceps.  
Mouth gag.  
Package sterile gauze.  
Castor oil, one ounce.  
Medicine dropper.

Hypodermic syringe, loaded with the anesthetist's preferred stimulant.  
Hypodermic syringe, empty.  
Glass sterile water, covered.  
Two anesthetic masks.  
Three small hand towels or napkins.  
Vomitus basin.  
Hypodermic tablets.

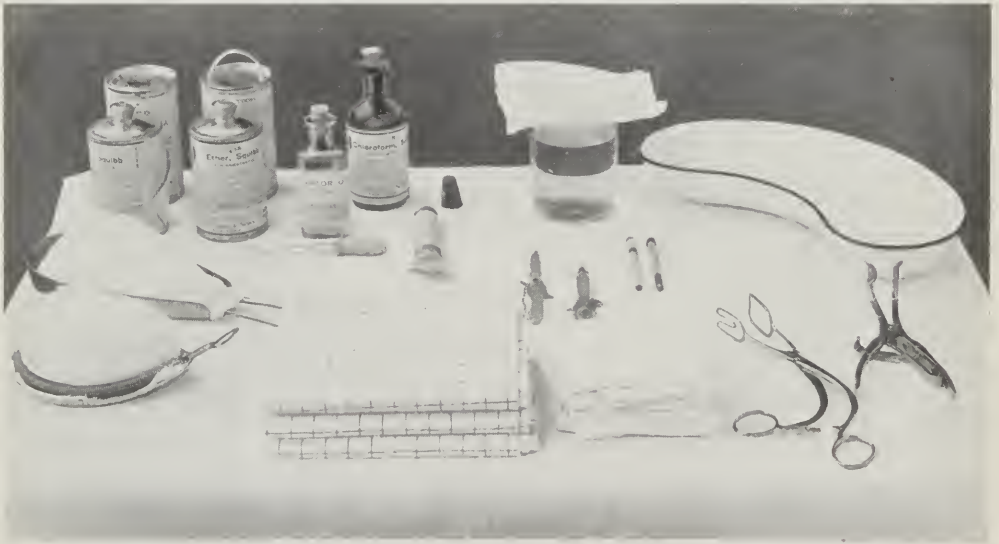


FIG. 4.—ANESTHETIST'S TABLE OF SUPPLIES.

The table contains the following: Cans of ether, chloroform, vaseline, castor oil, medicine dropper, hypodermic syringes, hypodermic tablets, glass of sterile water, vomitus basin, anesthetic masks, towels, package of gauze, mouth gag, tongue forceps.

The hypodermic syringe and tablets or stimulants are to be furnished by the anesthetist. It is incumbent upon the nurse to attend to the arrangement of the supplies of the anesthetist's table aside from the hypodermic syringes, unless she is instructed otherwise.

The tables are next to be set in the position preferred by the operator. The table or board intended to hold the basins and solutions for scrubbing up are arranged last; the hand brushes and solutions are placed thereon and covered with sterile towels until ready to be used (Fig. 9).

The storage containers of hot and cold water are brought in and placed in an out-of-the-way corner, but they should not be inaccessible.

The "kit," containing the sterile goods received from the hospital, is unpacked and its contents arranged upon the table reserved for unopened supplies.

Thus is the room prepared and arranged in a definite and painstaking manner. Up to this point all the work has been done by the nurse without personal sterilization. To complete the final and last steps of preparation, it is essential that the nurse now "scrub up," don sterile headpiece, gown, and gloves, and perform the final and last work of preparation with the assistance of an "unscrubbed nurse," or some person who can intelligently aid her in the last details.

The most approved methods of hand sterilization and robing oneself in a sterile gown well merit detailed consideration and discussion. I have deemed it of sufficient importance to devote a separate chapter to this subject alone. However, in order that I may not cause a break in the plan of preparing for an operation, our discussion will continue with the supposition that the "clean," "scrubbed," or "sterile" nurse has faithfully prepared herself to proceed with the arrangement of the supplies.

#### SETTING-UP

The "clean," "sterile," or "scrubbed" nurse, however she may be designated, properly scrubbed, gowned, and gloved, from now on has the help of an "unscrubbed" nurse, or assistant, who aids her in the final "setting-up." Thus, the clean nurse will not be rendered unclean by coming in contact with unsterile articles or containers.

The unpacking of the sterile goods of the kit is next to be undertaken. This kit may be a general, laparotomy, appendectomy, or a gynecological kit, according to the nature of the operation. A laparotomy kit contains

the following articles, which are to be unpacked and piled upon the table set aside for holding unpacked sterile goods:

#### LAPAROTOMY KIT

Sterile towels.....	3 packages, 1 dozen each
Sterile sheets.....	4
Sterile laparotomy sheet.....	1
Sterile laparotomy towel.....	1
Sterile gowns.....	5
Sterile dressings.....	5 packages
Sterile powder for gloves	
Sterile cotton.....	2 packages
Sterile sponges:	
12 long.....	2 packages
12 square.....	2 packages
24 long.....	3 packages
Medicated laparotomy.....	2 packages
Vaginal.....	2 packages
Sterile appendectomy strip.....	1
Sterile abdominal pads.....	2
Sterile perineal pad.....	1
Sterile applicators.....	1 package
Sterile packing, plain, 1-inch, 2-inch, 4-inch.....	1 each
Sterile packing, iodoform, 2-inch, 4-inch.....	1 each

#### Box containing:

Razor	Alcohol, large bottle
Assorted sizes rubber tubing	Green soap
Rubber and glass catheters	Ether, 4 cans
Douche and irrigating points	Chloroform, 2 bottles, 2 ounces each
Safety pins, 1 dozen	Sterile vaselin
Adhesive straps, 2 sets	Small chloroform mask
Catgut	Bandages, 2, 4, and 6-inch, 2 each
Silkworm gut	6 Nail brushes and orange-wood sticks
Pagenstecher	6 Face masks
Silk, fine and heavy	1 Douche bag
Black linen	1 Instrument pan
Carbolic acid, 95 per cent.	Hypodermoclysis needle
Carbolic and iodine	Surgeon's suits
Oil of cloves	6 Basins
Lime and Soda	1 Kelly pad
Bichlorid tablets	Instruments
Collodion	Needles
Tincture of iodine	Gloves
Harrington's solution	Drainage Tubes
Formaldehyd	

#### SETTING UP THE SUPPLY TABLE OF STERILE GOODS

The unclean nurse, who holds herself at all times ready to comply with the requests of the clean nurse, should know, or be instructed, how to open the containers holding the sterile goods in such a manner as not to con-

taminate the contents and yet permit the clean nurse (Fig. 6) to remove the contents without becoming contaminated. The illustration (Fig. 5) demonstrates a reliable method.

The first package opened should contain a sterile sheet, which is used



FIG. 5.—METHOD OF OPENING PACKAGE OF STERILE SUPPLIES BY THE UNSTERILE NURSE.

The ends of the package have been unpinned and unfolded. Grasping the sides of the package, the nurse, by a quick upward movement of the package, throws the wrapping open without touching the contents.



FIG. 6.—STERILE NURSE REMOVING STERILIZED SUPPLIES FROM PACKAGE PREVIOUSLY OPENED BY UNSTERILE NURSE.

The sterile nurse is wearing two pairs of rubber gloves. The cuffs of the outer pair are turned back so that they may be removed without touching the surface of the inner gloves.

to cover the open sterile supplies table and prevent the unsterilization of the articles that are piled thereon. With the table thus protected, place upon it, in an orderly and easily accessible arrangement, the following sterile goods: towels, sponges, packs, dressings, gowns, packing, drainage material, gloves, sutures, needles, needle holders, and scissors. Three



sterile basins must also be supplied to hold sponges, saline solution, and alcohol. Small cups for alcohol, iodine, carbolic acid, or any other solution employed, should be placed also upon this table.

This table is the nurse's work bench; it will be seen from the importance of the supplies thereon that the arrangement should be convenient and ample space allotted, so that when called upon, the work of the nurse may not be retarded by overcrowding or "cluttering up" of this table. The arrangement must, of necessity, be such that whatever is called for can be found instantly. As a suggestion for convenience, the following schematic arrangement will be found very satisfactory in actual work (Fig. 7).



FIG. 7.—TABLE OF STERILE SUPPLIES.

The contents of this table are as follows: *Upper row*—Sterile towels, surgical gowns, dressings, packing, drainage tubes, iodine cup, alcohol cup, carbolic cup, novocain or special solution in bowl, dusting powder. *Middle row*—Alcohol basin for sutures, tray for sutures, soiled sponge basin, sponges, gloves, basin for normal saline. *Lower row*—Threaded needles, suture scissors, needle forceps, rubber gloves, reserve supply of instruments.

This table set up, its contents are protected with sterile towels until the operation is begun.

#### SOLUTIONS AND SUPPLIES

There will be found in the hospital kit supplied by the surgeon the solutions and supplies listed on page 30. They are mentioned in this chapter in order that the nurse, in setting up the room, may make provision for their arrangement.

## INSTRUMENT TABLE

The surgeon may or may not send with the kit the instruments he will require. In either event, there must be provided an instrument table, which is protected by a sterile sheet (Fig. 8). The instruments must, of course, be sterilized, and this is accomplished by boiling for at least twenty or, better, thirty minutes. Passing time has witnessed the proposal of this

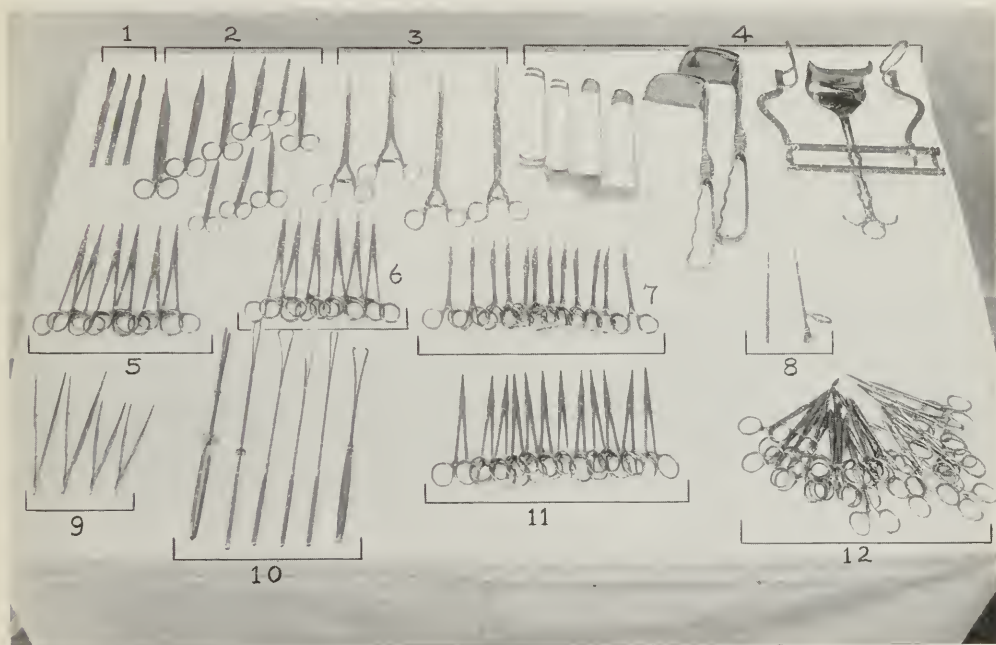


FIG. 8.—TABLE OF STERILE INSTRUMENTS.

The instruments are grouped as follows: (1) Scalpels; (2) scissors; (3) pedicle clamps; (4) retractors; (5) Mayo-Ochsner's artery forceps, straight; (6) Ochsner's artery forceps, curved; (7) Thornton's artery forceps, curved; (8) special instruments; (9) tissue forceps; (10) sponge sticks; (11) Kelly-Halstead artery forceps; (12) Pean's artery forceps.

or that method of instrument sterilization, only to have it demonstrated in the end as unreliable and not as effective as the simple process of boiling. Almost any sort of container may be used; a dish pan or bread tins will do. The instruments are to be submerged entirely in water. Here it is well to note that well or tap water is preferable to rain water. Rain water, as a rule, contains much organic matter and objectionable dirt. The well water or tap water used should be made slightly alkaline by the use of

soda, common washing soda or sodium hydroxid. When using the latter, an alkalinity of 1 in 100 is recommended.

There has been considerable discussion as to whether or not boiling destroys the cutting edges of knives or scissors. It is still a mooted question, and the nurse will find that some surgeons do not object to having their scalpels and scissors boiled, while others will strenuously object. In the latter event, the cutting-edged instruments must not be placed with the other instruments for sterilization by boiling. Such instruments are



FIG. 9.—ARRANGEMENT OF SCRUBBING-UP ARTICLES ON IMPROVISED BENCH.

The articles shown are as follows: Three basins for scrubbing, two pitchers of sterile water, three sterile brushes, cup for iodine, cup for hydrogen peroxid, bottle of hydrogen peroxid, bottle of green soap, bottle of iodine, basin of antiseptic solution, basin of alcohol, orange sticks.

usually rendered sterile by immersion in antiseptic solutions. One of the most common methods is to immerse them for twenty minutes in 95 per cent. carbolic acid solution and then place them in 70 per cent. alcohol until called into use. Of the two methods, I believe that boiling and immersion in alcohol is the method that insures greater asepsis, and that this method does not in the least affect the cutting edge. You must be guided in this, however, entirely by the surgeon's wishes, and, if unfamiliar with them, it is your duty to ask him to express his preference. Having done so, you should follow it regardless of your personal opinions.

After having been subjected to boiling for the allotted time, the instruments are removed under aseptic precautions and placed upon a sterile towel on one end of the instrument table. They are then to be dried with



a sterile towel and laid out in order upon the table. A pair of scissors for cutting sutures, and the needles as well as the needle holders are transferred to the sterile goods table. One who has had experience in various operations will know about how many of the different sutures will be required in the operation, and she will, of her own accord, before the surgeon commences his work, thread the various needles with sutures, thus having them ready for the surgeon before he asks for them.

It was a universal custom at one time for a nurse to have a basin of sterile water on the instrument table, which was used to remove bloodstains from the instruments. This is no longer considered good practice. Instruments that have been used once and laid down should be gathered up by the nurse, put aside, and not be permitted to be used again. The basin formerly used to wipe off these instruments is now used to hold the soiled or used instruments. This is the ideal practice and a distinct step in the advance of operative technique. Of course, if the surgeon has not provided himself with a sufficient number of instruments to permit such a practice, the nurse will then have to attend to keeping the instruments free from bloodstains.

The operation completed, all the instruments, whether they have been used or not, should be boiled again in alkaline water and carefully dried. I wish to reiterate the caution—carefully dried, because it may be several hours before the surgeon is able to return the instruments to his private nurse or hospital, and in that time they may rust to such an extent as to damage the more delicate ones and render them unfit for future use. Therefore, exert sufficient effort to prevent such a mishap, and be sure that all the instruments are thoroughly dried before being packed in the surgeon's bag. Scalpels, scissors, and all cutting instruments should have their edges protected by means of cotton if they are without special carrying cases.

The work of boiling and drying the instruments should take place immediately after the completion of the operation in order that the surgeon may take them with him. He cannot allow you to postpone this duty until a more convenient time, for he does not know at what moment he may be called upon to use them in another case. If needed soon, it would

be time-consuming and annoying to have to send or make a special call to obtain them. He will appreciate your promptness in this respect and also the care and neatness with which you pack them in his instrument case.

#### DISMANTLING THE ROOM

The operation completed, the patient returned to bed, the surgeon's instruments boiled, dried, and packed in his bag, the task of dismantling the improvised operating room should be undertaken immediately, and all traces of the use to which the room has been put should be speedily removed.

Here, again, a methodical course will enable the nurse to complete this duty with the greatest speed. All the dressings that were not used should be given to the nurse who remains on the case for resterilization and use in subsequent dressings. Place a large newspaper in one corner of the room and upon this collect all the soiled and useless dressings and material to be destroyed. When all such material has been collected, it may be wrapped up and carried to a fire and burned.

The surgical gowns, if badly soiled with blood, should be rinsed out in cold water and dried immediately by means of artificial heat, and then folded and packed in the kit. All the returnable goods are to be collected and returned to their containers, and the kit returned to the hospital as promptly as possible. It is unpardonable to retain possession of this kit for a longer time than is necessary to remove the bloodstains from the gowns and to pack it.

The foregoing directions leave undisposed of only the furniture and sheets that were used in setting up the room. These should be taken down, folded, and given to a member of the family or servant to be sent to the laundry. In like manner, the utensils used are cleansed and returned to their sources. The assistance of members of the family is then secured and the room resettled with its customary furniture.

A word of caution that should be ever in the nurse's thoughts while preparing an operating room in a private home—perform your work in such manner and with such care as to cause as little damage to the room as possible. While the owner of the home will usually consent to property

damage, if in so doing the safety of the patient will be enhanced, one should always remember that ruthless and needless marring of walls or furniture renders one culpable.

In conclusion, the surgical nurse must remember that the safety of the patient depends upon her, as one of the group of actors in the operative drama, and that the faithfulness with which she discharges her duty will have a distinct influence upon the final result. The safety of the patient is dependent upon the thoroughness of your technique and your observance of the rules of asepsis. With this clear understanding before you at all times, there can be no hesitation as to the way you acquit yourself. You are intrusted with a sacred duty; you cannot afford to violate the trust imposed on you if you are desirous of gaining a reputation as a capable and efficient surgical nurse.

## CHAPTER III

### METHODS OF HAND STERILIZATION

Present-day surgical procedures have been made possible and their detailed requirements perfected by reason of the development of an aseptic technique. It is not so many years ago that operative work, even in minor surgery, was an extremely perilous undertaking, being attended with a high rate of mortality due solely to wound infection. The dread of the operative risk caused many a patient to endure his condition rather than venture a chance; for it was chance which determined whether or not the work of the surgeon was undone by subsequent infection through a lack of knowledge and application of the principles of asepsis.

Today all this is changed. The surgeon, physician, and nurse are in possession of knowledge that enables them to state that surgery may be resorted to with but little dread of septic catastrophe. They can make this statement by reason of their knowledge of bacteria and the known avenues by which infection is introduced. With a knowledge of the mode of transmission and implantation of bacteria and of the means by which they may be destroyed, it is possible to lessen the danger of their entrance and destructive action in the operative field or wound.

To prevent infection and to observe an aseptic surgical technique, it is essential that one possess a fundamental knowledge of bacteriology. It is not within the province of this chapter to impart such knowledge in detail, but a few of the elementary principles of bacteriology are stated that later observations may be more clearly understood.

Bacteria and their spores have been demonstrated as the exciting factors of infection and its subsequent train of symptoms. It is conceded that they are introduced from without and, in certain instances, may arise from within. It is their presence together with their products in the body that causes the several conditions known as septic infections. In surgery, the term sepsis or septic is a general one, employed to convey

the information that microorganisms have appeared. The terms are void of specific meaning. To be explicit one must determine the particular form of organism. This is possible, in most instances, by means of a microscopical examination of the wound discharges or of cultures obtained from the blood stream or body secretions.

It has been demonstrated that the results of sepsis are not due primarily to the bacteria but to the absorption of those products formed by the chemical action that takes place after the microorganisms multiply and grow in the wound and surrounding tissues.

Our bacteriologists have isolated and described the following common forms of bacteria most frequently found in wounds considered as infected or septic:

*Staphylococcus pyogenes albus and aureus.*  
*Bacillus coli communis.*  
*Streptococcus pyogenes.*  
*Bacillus pyocyaneus.*  
*Bacillus tuberculosis.*  
*Gonococcus.*

*Pneumococcus.*  
*Bacillus typhosus.*  
*Bacillus diphtheriæ.*  
*Aërogenes capsulatus.*  
*Bacillus tetani.*

The reader is referred to a textbook on bacteriology for the salient characteristics of these organisms.

It was first demonstrated by Wright, and since confirmed by numerous investigators and clinicians, that there exists in the human body a force capable of producing certain substances called antibodies, or opsonins, which possess the power of inhibiting or rendering inert those microorganisms that bring about septic conditions. This is the barrier that Nature throws out for self-preservation and to ward off bacterial invasion. In the state of health such a defense, in most instances, is sufficient. By reason of disease, however, or any undermining condition that deflects the physiological functions from the normal and so creates a lowered physical state, Nature is incapable of throwing out a sufficiently strong barrier to overcome microörganic invasions. The barrier is broken through, the infection gains a foothold, characteristic symptoms and conditions are produced, and then that state known as sepsis, or infection, is established, carrying with it its dismal troop of potential eventualities.

When such a calamity—for the onset of an infective process is nothing

short of a calamity—occurs and gains a firm foothold, our duty lies in an endeavor to overcome and render innocuous the invading organisms. Many have been the plans of attack that have been devised; many of them have fallen short of being what may be termed reliably effective or dependable. For this reason the laboratory worker has been appealed to and urged to supply us with an effective combating agent. As a result, we have had presented to us the principles of serum therapy with its serums, antitoxins, and autogenous vaccines which, though not as yet completely understood, promise much toward supplying us with extremely potent combating agents.

This brief explanation of bacterial infection is employed as an introduction to this chapter for the purpose of impressing upon the reader the importance of a knowledge of bacteriology when preparing oneself for operative work. What has been aptly termed *an aseptic conscience* is imperative for the development of a modern surgical technique. Unless a nurse knows the cause, development, prevention, remedial agents, and methods for combating infection, she should not be intrusted with the duties a surgical nurse is called to perform. The principles of asepsis, therefore, merit your persistent study and observation.

How may these infective organisms gain entrance into an operative wound? This is difficult to determine exactly, for there are times when, after the greatest precautions have been taken, the succeeding days reveal a septic infection. This is the reason that present-day methods call forth the need of exercising to the fullest extent the principles that have been established to prevent wound infection during any surgical operation. The most common routes of invasion are from the use of improperly sterilized instruments, sutures, drainage material, sponges, dressings, and the hands of the surgeon, his assistants, or nurses; in fact, anything that comes in contact with the wound or is touched while working in an artificial opening through the cutaneous surface may bear the germs of infection. Knowing this, no operative undertaking today may be appraised as safe until every act connected therewith has been safeguarded by those methods that have been proved efficient in preventing contamination of a wound. It is this knowledge that has developed aseptic surgery



and made imperative the institution of sterilization as a prophylactic measure.

This prophylactic precaution is accomplished by means of certain fairly definite steps. One of these steps was described in our previous chapter devoted to the preparation of the operating room. The second step is the preparation of the hands of those who come in contact with the wound. The third step is the preparation of the patient and the field of operation, which will be taken up in our next chapter. This brings us then directly to our present subject:

#### PREPARATION OF THE HANDS—SCRUBBING UP

When it was first determined that the hands of the principals in an operation were carriers of infectious bacteria, many and various methods or procedures of hand sterilization were advanced. No sooner was a method proposed than its deficiencies were pointed out and another method was advocated. So the pendulum swung from one method and extreme to another. From all the discussion, experimenting, debating, and testing, however, there eventually emerged several methods that have withstood the tests imposed and are conceded as dependable and reliable. Some of these are most elaborate and complex, others are comparatively simple, but none the less efficacious.

In our leading clinics and hospitals today two methods are chiefly employed in the preparation or sterilization of the hands. It is essential that a surgical nurse be familiar with both methods. In referring to the hands, it must be understood that, in a surgical sense, we mean the hands and arms up to the elbows.



FIG. 10.—SCRUBBED NURSE  
IN STERILE GOWN AND GLOVES  
READY TO WORK.

All of the methods of hand sterilization call for scrubbing with soap and warm water for a period of at least ten minutes. In hospitals where scrubrooms are provided in the operating suite, the scrubbing is done under taps of running cold and hot sterile water. In a private home, without these conveniences, we are forced to use hand basins containing the scrub water. In this event we must secure and provide a sufficient amount of water to allow frequent changes.

Many brands of soap of various formulæ have been marketed for this surgical procedure. Some of them are of value, others are valuable in



FIG. 11.—NURSE'S HANDS SHOWING TWO PAIRS OF RUBBER GLOVES.

name only. The most satisfactory are our common tincture saponis viridis, or green soap, a standard soft soap, and ivory soap. The simple "soaping" of the hands is insufficient; hand scrub brushes are employed. While there are some who object to that use of scrub brushes for the reason that they are said to produce a trauma of the hands, the objection thus raised is trivial. These objectors employ a washcloth, but the use of scrub brushes is fairly universal.

Before describing the methods of scrubbing up, it may be well to insert a brief paragraph on the wearing apparel of those engaged in an operation. The days are past when the good old doctor or professor entered the operating room wearing his street clothes, white boiled shirt, and starched collar, and simply laid his top coat and cuffs aside, rolled up his sleeves,



washed his hands in a little water, and proceeded to operate. Surgery today demands that we give the same attention to the cleaning of our bodies and to the wearing of suitable operating-room clothes as we do to our hands and instruments. It is hardly necessary to mention that a general bath is essential on the day of operation. Before entering the scrub room one should don an operating suit and shoes that are freshly laundered and which may well be sterilized the same as are the dressings. The surgeon and his assistants usually wear a shirt, white canvas trousers, and white canvas shoes during all major operations, and also in minor operations when a general anesthetic is used or sterile work is done. The nurse should wear a clean uniform and canvas shoes. She should be particular to be comfortably dressed; tight wearing apparel that restricts or retards free physical movements must be avoided.

Before beginning the process of scrubbing, one should carefully manicure the finger nails. The nails should be kept trimmed round and close—not pointed. Just before scrubbing, whatever dirt may have become lodged under the finger nails should be removed by means of an orange stick and peroxid of hydrogen. Next, the headpiece should be put on, one that entirely covers the hair, and following this the nose and mouth mask. In several places we have noticed that this covering for the hair, nose, and mouth is neglected until after the scrubbing process is completed. This is an error in technique which should not be overlooked. Thus clothed and prepared, one is ready to commence to scrub.



FIG. 12.—SURGEON PROPERLY GOWNED AND GLOVED.

The scrubbing of the hands, necessarily, must be a perfunctory and ineffective proceeding unless we remain conscious of the purpose for which we are employing this precaution and endeavor to attain the bene-

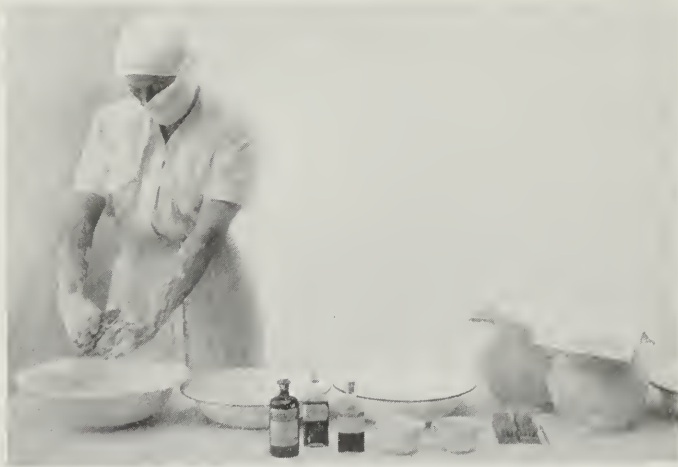


FIG. 13.—PREPARATION OF THE HANDS WHEN RUNNING WATER IS NOT AVAILABLE. NURSE SCRUBBING.



FIG. 14.—GOING THROUGH SOLUTIONS. RINSING OFF SOAP.

ficial results of the method. It should be a procedure, therefore, characterized by methodical completeness.

The materials and the preliminary scrubbing may be outlined as follows:

1. Running hot tap water or basins containing sterile water.
2. An ample supply of suitable soap.
3. Scrub brushes.
4. Wetting the hands and arms thoroughly.



FIG. 15.—APPLYING 70 PER CENT. ALCOHOL.



FIG. 16.—SCRUB ROOM.

Note one surgeon scrubbing up, dressed in duck shirt, trousers and shoes with face mask and headgear on. Note handles for controlling water by knee pressure. Note sand glass, 10 minutes, to accurately time scrubbing. The surgeon's assistant has finished scrubbing and is cleaning his hands in the antiseptic solutions. A section of supply cupboards.

5. Rubbing in an ample amount of soap, which is worked into a lather, covering the entire surface of the hands.
6. Rinsing off this first lather.
7. Resoaping.

8. Scrubbing with a brush or cloth in a systematic manner, commencing with the thumb, and in succession scrubbing the inner and outer surfaces of the thumbs and fingers of both hands, then the palms and dorsa of the hands and, lastly, the forearms. Ten minutes is to be thus employed, all the while using a sufficient amount of soap and water. The more thoroughly we scrub the more bacteria are removed.

9. Thoroughly rinse off the soap—not by a simple dab or splash in the water, but thoroughly remove every trace of soap. This is important. If it is not done, the antiseptic solutions subsequently employed will be inert, for the almost indiscernible film of soap covering the skin will prevent antiseptic action. This precaution is frequently overlooked; therefore, be sure to secure a complete rinsing with as hot water as can be borne to remove all the soap and oils or fats of the soap which form a coating over the skin.

The next step in hand sterilization is accomplished by the use of certain chemical antiseptic solutions of known germicidal power. They are



FIG. 17.—APPLYING IODIN TO NAILS.

demanding for the ideal procedure in our endeavor to secure as perfect aseptic preparation as possible. Their nature and chemical formulæ are numerous and varied in character. Some of them are potent, some are not. Some are reliable, some only partially so; a few are wholly without antiseptic properties, either because of their nature or the manner in which they are used. The following are the more frequently used antiseptics in varying solutions:

Carbolic acid.

Lysol.

Bichlorid of mercury, or mercuric chlorid.

Tincture of iodin.

Alcohol.

Potassium permanganate.

About ten years ago the late Nicholas Senn caused his assistants to undertake a series of experiments and investigations with the object of determining the length of time required for different chemical antiseptic agents of various strength and solutions to destroy bacteria and render

them and their spores inert. The result of these experiments<sup>1</sup> has been condensed as follows:

The germicidal power of iodine is far superior to that of bichlorid of mercury, the acknowledged leader of all antiseptics. This was shown by experiments made with a 1 in 100 solution of bichlorid of mercury on the streptococcus pyogenes. It was found that an exposure of fifteen minutes, although showing considerable inhibitory power, permitted a good growth of streptococci to appear. An exposure of thirty minutes gave no growth. The superiority of iodine is readily evidenced by the experiments that showed the destruction of the streptococci after two minutes' exposure in a 0.2 per cent. solution.

A 1 in 40 solution of carbolic acid requires ten minutes to kill the streptococcus.

It takes thirty minutes for a 1 in 1000 solution of bichlorid to kill the bacillus of anthrax.

Ten hours are required for a 1 in 1000 solution of bichlorid to kill the tetanus bacillus.

Alcohol, 70 per cent., requires five minutes to be effective.

Iodine in 0.5 per cent. solution is amply strong enough for all uses.

Thus was it demonstrated how utterly useless it is for one to immerse his hands or arms in a solution of bichlorid for but a minute or two and feel content and safe that infective bacteria are destroyed. To use a disinfectant effectively demands that the hands and arms be immersed in it for the entire time required to destroy the several bacteria—from five to forty-five minutes—and then we are not sure that the tetanus bacillus or even the streptococci and staphylococci, if present, are destroyed. On the other hand, a solution of iodine kills and destroys the spores of every infecting organism in a space of two or three minutes if used in the recommended strength, many of them being destroyed at the moment of contact. Iodine has an additional value, namely, its penetrating property.

I cannot but wonder how these conclusions will impress those who have been accustomed simply to dip their hands in a solution of bichlorid of mercury with the thought that by so doing they were rendering them free from bacterial contamination. Such a method is little better than employing so much water. Thus, too, is it demonstrated that the mere trickling of a solution of bichlorid over the operative field is of little value. In this instance the scrubbing with soap and water is the most effective antiseptic agent. The more thorough the scrubbing, the fewer bacteria will there be. There are some who depend upon scrubbing alone and do not use any bacterial destroying agents. The final process of hand sterilization should consist of the following:

<sup>1</sup> Surgery, Gynecology, and Obstetrics, Vol. I, No. 1, July, 1905.



1. The introduction of a 50 per cent. tincture iodine solution in alcohol under the finger nails and around the matrices by means of an orange stick.
2. The rubbing into the skin of the fingers and palms of the hands this same strength iodine for a period of at least two minutes. Here it must be noted that iodine rapidly loses its full strength. The more recent its preparation the more potent. Iodine, thus employed, should not be more than one week old. This method does not cause exfoliation or blistering of the skin.
3. The bathing of the hands and arms in 70 per cent. alcohol for a period of at least three or four minutes. This is best accomplished by having a sterile sponge to apply the alcohol in a manner similar to the use of a washcloth. By this means all traces of the staining properties of the iodine are removed. The alcohol is not dried off by means of towels; it is allowed to evaporate, and while it is evaporating, one may proceed to put on the sterile gown.

This is a reliable method of hand sterilization which repeated tests have proved entirely satisfactory and efficacious.

The following methods will be found in use in several clinics:

**The Welch-Kelly Method.**—After a thorough scrubbing of the hands and forearms, they are immersed in a saturated solution of permanganate of potassium for two or three minutes. This causes the cutaneous surface to become very dark brown. The hands and arms are then immersed in a warm solution of oxalic acid, of saturated strength, until all the stain of the permanganate is removed. They are then thoroughly rinsed in sterile water and immersed for two minutes in a 1 in 5000 solution of bichloride, rinsed in sterile water, and dried on a sterile towel. For some, this method is very irritating to the skin and cannot be endured for any length of time.

**The Weir-Stimson Method.**—After the hands are scrubbed, a tablespoon of chlorinated lime, a piece of crystalline carbonate of soda, and a little water are mixed in the palm of one hand, and the resulting creamy mixture is thoroughly rubbed into the skin until the rough granules of the soda are no longer felt. This requires from three to five minutes. The hands are then rinsed in sterile water. The disagreeable odor of the lime is removed by the use of sterile ammonia water in the strength of  $\frac{1}{2}$  to 1 per cent. The value of the procedure rests in the free chlorine that is thus liberated.

**The Sublimate-Alcohol Method.**—After scrubbing, the soap is removed by dipping the hands in 95 per cent. alcohol. The hands are then immersed in 70 per cent. alcohol containing 1 part in 1000 of corrosive sublimate for a period of three minutes, using a piece of sterile gauze to work in the solution. Lastly, the hands are rinsed in sterile water.



FIG. 18.—PUTTING ON  
STERILE GOWN, HANDS IN  
THE SLEEVES OF THE GOWN.



FIG. 19.—SLIDING INTO THE GOWN.



FIG. 20.—UNSTERILE NURSE  
TYING THE GOWN. STERILE  
NURSE TYING THE TAPES OF  
THE SLEEVES.

**Oil of Cloves Method.**—After scrubbing, the hands are immersed in a 1 in 1000 solution of bichlorid. This is followed by rubbing in one or two drams of pure oil of cloves, which is subsequently removed by a vigorous washing in 70 per cent. alcohol.

**Lysol Method.**—Immerse the hands in 1 in 1000 bichlorid, followed by a 1 in 10 solution of lysol and then 70 per cent. alcohol.



FIG. 21.—PREPARING FOR OPERATION.

Note method in which nurse holds doctor's gloves to assist putting them on. Dry gloves. Unclean nurse fastening gown in back. Assistant ascertaining whether all necessary instruments are on the instrument tray.

Many are of the opinion that the value of these methods lies solely in the protection that is afforded by the alcohol. This is a debatable question and, in spite of the evidence that is submitted, some will be found who will not desert the method which they have been accustomed to employ. Our aim should be to use as simple a method as is consistent with potency in attaining the desired end—hands that are rendered as sterile as it is possible to make them. You, as nurse, will be compelled at times to follow the fancy of the surgeon whom you are assisting and, since he is





FIG. 22.—PREPARATIONS COMPLETED.

On the table are boiled gloves (tied in pairs) in sterile basin, dusting powder, stack of towels, powder basin, and stack of glove envelopes, all sterile.



FIG. 23.—GLOVES, TOWELS, BASIN, AND ENVELOPES ARE KEPT COVERED WITH STERILE TOWELS DURING THE PROCESS.



FIG. 24.—REACHING UNDER PROTECTING TOWEL FOR PAIR OF GLOVES.



FIG. 25.—DRYING THE BOILED GLOVES WITH A STERILE TOWEL.



FIG. 26.—DIPPING GLOVES IN POWDER BASIN.



FIG. 27.—TURNING GLOVE THAT HAS BEEN POWDERED ON ONE SIDE SO THAT THE OTHER SIDE MAY BE POWDERED ALSO.



FIG. 28.—PUTTING THE GLOVES IN A STERILE CLOTH ENVELOPE.



FIG. 29.—CLOSING CLOTH ENVELOPE.



FIG. 30.—FIRST STEP OF WRAPPING ENVELOPE IN PROTECTIVE COVERING.



FIG. 31.—PINNING FIRST FOLD OF PROTECTIVE WRAPPER.

responsible for the operative results and the acts of all those engaged in it, he may rightly dictate the method you are to follow. Others will rely upon your training and will tell you to employ the most effective means.

Until within recent years it was customary to engage in surgical work with the hands thus prepared. Now an additional safeguard for surgeon and patient is utilized, namely, the wearing of sterile rubber gloves. Professor Halstead of Baltimore is to be credited with the institution of



FIG. 32 —STERILE GLOVES PACKED IN PROTECTIVE OUTER WRAPPER.

this method, for it was he who first suggested it in 1889. The fact that gloves are worn must not cause one to feel oversecure or conclude that their protection permits a slighting of the enumerated details of hand sterilization. A rubber glove torn or punctured should be immediately replaced by a perfect glove. While their preparation and care occasion extra work for the nurse, they should certainly be worn. Dry gloves are preferable to wet ones, for wet gloves soon cause the fingers to become sodden like those of a washerwoman, and the delicacy of the touch is lost or impaired.

Scrubbed, gowned, and gloved by these methods, one may consider



himself as properly prepared to participate in an operation, provided the steps of preparation that have been advanced have been faithfully and conscientiously enacted. Hands may be made sterile, but they will not remain so unless we are constantly alert to keep them so.

The scrubbed nurse must ever guard against coming in contact with anything that is not sterile. When not engaged in active work, the hands should be held above the level of the waistline. They are to be kept clean by washing in a basin containing a potent antiseptic, followed by rinsing in sterile water as frequently as they are badly soiled with blood or wound secretions. Some operators go to the extent of covering their rubber gloves with sterile cotton ones until the abdomen is open and then removing them. This is partly to protect the rubber gloves from soiling before the intra-abdominal work is undertaken. If, perchance, one does accidentally touch an unsterile object, the glove or gloves are immediately removed and a fresh pair put on. In gynecological surgery where both vaginal and abdominal work is done, fresh gloves are put on when transferring from one field to another. Added security is attained if, just before putting on the second pair of gloves, the hands are run through the hand solutions. The gowns are, of course, always changed.

It is an excellent step in technique for the nurse to wear two pairs of gloves while giving the field its final preparation and draping the patient, and then remove the outer pair when all is in readiness. Thus will she be provided with a clean pair of gloves when the real operative work is begun. If two operations are to be performed upon different patients in the same home, we must necessarily go through all the steps of hand preparation for each case.

The recommendations and methods proposed and described in this chapter are commended with the caution that the mere knowledge of these facts is insufficient. To accomplish the most, they must be understandingly and systematically applied. This may be accomplished in the highest degree only after repeated reflection. The subject demands one's close attention and study. Develop an aseptic conscience and remember at all times that you become an accomplice if a fatal termination may be traced to your acts of omission or commission while preparing to enact a part in any surgical operation.

## CHAPTER IV

### THE PREPARATION OF THE PATIENT

Of all the preparative work essential to a surgical operation, no procedure is more difficult or more diversified than the preparation of the patient. The nurse is necessarily compelled to correlate her efforts in such a way that, when the task is completed, the entire procedure centers around one point—complete asepsis.

To secure in this task a thorough course of procedure, one is compelled to devote to it constant thought and study. Daily practice and frequent reviews are necessary to enable the nurse to carry out her work efficiently.

None of the methods of surgical technique has changed so often as that of preparing the patient. One rule or another is being modified from year to year. Each new beam of scientific light creates new conditions, and we, perforce, must adapt ourselves and our work to comply with the requirements of more recent knowledge. The tendency is to do away with the elaborate and time-consuming methods of the past whenever it has been satisfactorily demonstrated that a simpler technique is equally efficient and reliable. It is only by constant study and practice that we are enabled to adapt ourselves and our work to the latest demands of surgery.

#### GENERAL OR CONSTITUTIONAL PREPARATION

As all surgical work is occasioned by abnormal physical conditions, arising either as emergencies or as the result of a gradually developing pathology, it will be perceived that the general preparation of the patient will be varied, according to the amount of time allowed.

Every individual submitting to surgical interference and its resulting confinement in bed for a longer or shorter period of time, should spend from at least twenty-four to thirty-six hours in bed in preparation for the ordeal. The advantages of such a preparatory rest have received considerable discussion, and varied opinions have been expressed regarding



this requirement. As a result, some surgeons insist upon two or three days' preliminary rest in bed, while others are satisfied with but twelve hours. The argument advanced by the latter is that the longer a patient is confined to his bed the lower will be his physical resistance. On the other hand, those favoring a longer period of preoperative preparation maintain that their patients come to the table in better condition and, therefore, are better able to withstand shock, thus increasing their chances for ultimate recovery.

The preliminary care must be of such a nature as to secure the following results:

1. Complete emptying of the intestinal tract, not by one dose of a drastic cathartic, but by the use of milder drugs. To lower the physical resistance by means of a violent cathartic is to defeat the purpose of preparation.

2. A normal, or as nearly normal as possible, functioning of the kidneys.

3. Nourishment and elimination kept up by simple, concentrated, bland diet and an abundance of water.

4. A stimulation and equalization of cutaneous circulation and elimination by means of baths and massage.

5. Accustom the patient to the use of bedpans, urinals, and douche pans.

6. That mental and physical condition of rest which tends to enable every patient to resist the operative procedure.

If these are desirable features, and they have not been demonstrated otherwise, it is unreasonable to assert that they can be secured in the brief space of twelve or eighteen hours. Consequently, I am inclined to recommend from twenty-four to thirty-six hours of preliminary preparation, so that the patient may come to the table in the best possible physical condition.

The indications for operative work may be so imperative, however, that the general physical state of the patient may be considered of lesser moment than the surgical need, and operative work must be instituted at once, regardless of the general physical findings. This is the only excep-

tion to the rule. At all other times we should endeavor to attain the greatest degree of physical normality and function.

Before a surgeon recommends an operation, he should give due consideration to the patient's physical state, and should require a thorough examination, including a careful inspection of the lungs, heart, and eliminating organs, together with such laboratory analyses as may be indicated. By means of the knowledge thus obtained, the surgeon is able to determine what preoperative treatment will be required to enable his patient to come to the table in a satisfactory condition. In general, the following procedures should be observed.

**The Teeth.**—The condition of the teeth merits attention, and a visit should be made to the dentist for the removal or filling of decayed teeth and treatment of diseased gums. The teeth should be as perfect as mechanical skill can make them. Greater comfort for the patient during the post-operative days will thus be secured. Education has brought about a more general interest in the care of the teeth, and the toothbrush is in common use; still, the majority who neglect their teeth remains large. Upon assuming charge of a case, therefore, you may have to request the patient to attend to the care of the teeth. It is the duty of the nurse to insist upon the frequent use of a toothbrush, either with or without a dentifrice.

**Stomach and Bowels.**—When placed upon an operating table the patient should, as a rule, have no digesting food in the stomach, and the large intestine must be empty. This does not imply that patients must be starved, nor does it mean that they are to be subjected to the action of drastic purgatives. The plan usually adopted consists of a course of calomel forty-eight hours previous to operation, followed by a saline. On the day following the use of calomel and preceding the operation, one ounce of castor oil should be given, usually at 4 p.m.; on the following morning (the day of the operation) one or two enemas are given. This treatment will produce a satisfactory emptying of the intestinal tract. When rectal or vaginal work is to be done, or in work upon the stomach, it is imperative that the colon be entirely empty. The nurse must be certain that all of the enema has been expelled. Nothing is more annoying

or indicative of carelessness on the part of the nurse than to have the work of the surgeon delayed or interfered with by reason of bowel movements and the soiling of drapings in the midst of an operation.

For two or three days previous to operation, the patient's diet should consist of bland and nutritious food, without bulk, and he should be encouraged to drink an abundance of pure water—at least a glass every two hours, to within one or two hours before the operation. The evening meal on the day before the operation should be light, consisting of broth, toast, soft-boiled egg, and milk or tea. A cup of broth or milk at nine and twelve o'clock at night is permissible. If the operation is planned to take place late in the morning or early afternoon, broth and toast may be served for breakfast. A safe rule to follow is to give no nourishment for six hours previous to the administration of the anesthetic. In operative work on the stomach at least ten hours should elapse after the last taking of food.

**The Kidneys.**—Even though the surgeon or the attending physician may have made a urinalysis, a specimen of urine should be obtained and given to the surgeon or physician at the time of his visit on the day before operation. From a female patient, the specimen should be obtained by catheter.

The object of securing a specimen of urine is to determine the state and activity of the kidneys. Kidney disease or deficient kidney secretion may, at times, cause all operative undertakings to be either postponed or abandoned entirely. The presence of sugar, albumin, casts, acetone, diacetic acid, or marked indican reaction in the urine of the patient, as a rule, should cause the postponement of all but emergency operations. The presence of albumin alone, with an absence of granular or fatty casts, does not necessarily indicate a serious kidney lesion. It should put the surgeon on his guard, however, and influence him in the selection of the anesthetic agent.

**Baths.**—During the preparative rest in bed two or three sponge baths a day may be given advantageously, followed by a general massage and rub with alcohol or cocoa butter. This will increase the cutaneous circulation and elimination and also be restful and comforting to the patient.

On the morning of the operation the bath should be given not later than two hours before the time set for the surgeon to commence his work. Under no circumstances should the nurse include the field of operation in this last preoperative bath.

**The Night before Operation.**—The patient should eat a light supper, as previously suggested. A warm sponge bath, followed by an alcohol rub, should be given at about nine o'clock, and the field of operation pre-



FIG. 33.—SURGICAL LEGGINGS.

pared according to the surgeon's orders. If no other instructions are given, the field should be shaved.

The ordeal that he is to undergo on the following morning often causes the patient to be more or less restless, and he finds it difficult to fall asleep. At least six or eight hours of continuous slumber should be secured if possible. The nurse will find that the bath and rub, followed by a cup of hot milk, will frequently be sufficient to induce sleep, especially if the house is quiet and an abundance of fresh air is admitted to the room. A tactful, reassuring nurse, with a timely word and an encouraging smile, can do much to maintain a quiet mental attitude in her patient. Secure the confidence of your patients; be frank and open with them. Do not tell a

falsehood in reply to a patient's question, no matter how good your intention may be.

#### SCHEDULE OF PREOPERATIVE PROCEDURE

The following schedule of work for the day previous to the operation, if it is to take place in the home, is submitted as a suggestive outline of the nurse's activities. It must necessarily be altered in given cases.

##### A.M.

- 7:00 Bath and general rub.
- 7:30 Breakfast.
- 8:00 Instruct servants or assistants to dismantle room selected for operation and clean it.
- 9:00 Begin preparation of operating room.
- 10:00 Cup of broth or milk.
- 11:00 Calomel, grains 2 or 5, if such is surgeon's order.
- 12:00 Operating room preparation complete. During morning patient has been given several glasses of water.

##### P.M.

- 12:30 Lunch.
- 1:30 Seal operating room and fumigate it. Patient induced to take nap.
- 2:30 Sterilize utensils and arrange for hot and cold sterile water.
- 4:00 Effervescent citrate of magnesia, or a saline cathartic if the patient has taken calomel. If calomel has not been administered, give castor oil, 1 ounce.
- 5:00 Soapsuds enema.
- 6:00 Light supper.
- 7:30 Open operating room for airing.
- 8:00 Enema, douche, shave field, general bath, and rub. Make comfortable for night. Glass of hot milk.
- 9:30 Patient asleep; abundance of fresh air.
- 12:00 If patient is awake, cup of hot broth or milk is given.

##### A.M.

- 5:00 If awake give a cup of broth.
- 6:30 General bath, rub, enema, douche.
- 7:30 Hypodermic of morphin, if ordered; put on leggings and headpiece. Catheterize.
- 8:00 Ready for operation.

If the operation is to take place later in the morning the suggested outline may be changed so as to adapt it to the hour selected.

## CHAPTER V

### THE PREPARATION OF THE OPERATIVE FIELD

The preparation of the field of operation calls for as careful and painstaking technique as the preparation of the surgeon's and nurse's hands. The methods employed have been varied from time to time. Present-day methods are characterized by their simplicity. It was but a few years ago that the universal technique was outlined as follows:

On the afternoon or evening previous to operation, the field was shaved and a soft soap poultice applied and permitted to remain from one to two hours. Then followed a thorough scrubbing with soap and water with the use of a brush. This, in turn, was followed by ether, bichlorid, and alcohol. The field was then covered with sterile dressings maintained in place by a binder or bandage. When the patient was placed upon the operating table, and coincident with the administration of the anesthetic, the final steps of preparation were taken. These consisted of again scrubbing the field with soap and water, followed by the application of ether, bichlorid and alcohol. The preparation was then considered complete.

Today this method has been simplified and the general practice consists of the following:

On the afternoon or evening previous to the day of operation, the field is shaved and cleansed by means of a simple bath of soap and water. No dressings are applied, and care is exercised that no water comes in contact with the field within six hours of the final preparation.

When the patient is placed upon the table, and coincident with the administration of the anesthetic, the field is exposed and surrounded with sterile towels. By means of a sterile gauze sponge held in a sponge holder, the field is thoroughly gone over with pure benzin or benzin-iodin (iodin crystals, 1 part, to benzin, 1000 parts). This solution of benzin is permitted to evaporate thoroughly, which requires about two minutes. The entire



field is now gone over again with a 50 per cent. tincture of iodine in alcohol. The field may then be considered sufficiently prepared, and is ready for its final draping.

In vaginal work the vagina is cleansed with alcohol, and the cervix and mucous membrane, as well as the labia and surrounding cutaneous surface, are painted with the iodine solution.

In rendering this final preparation to the skin it is well to sterilize an area considerably beyond the proposed line of incision. For illustration, in a laparotomy for work upon the pelvic organs, the area prepared is bounded by a line across the abdomen an inch above the umbilicus, by a line extending across the thighs level with the pubes, and on either side by a boundary continuing in line with the trochanter of the femur. A similar area is prepared when the work is being done in the upper abdominal cavity. It is better to prepare too large a field than too small, for the exigencies of any operation may demand that the surgeon extend the incision beyond the length first planned, and he should not be delayed by being compelled to wait until the additional field is sterilized.

When applying the benzoin and iodine, the nurse should have the solutions in small sterile basins or cups. A sterile sponge is folded and held in a sponge stick. The benzoin is first applied to the umbilicus. This sponge is then discarded. A fresh sponge is put into the holder, and with it the benzoin is applied to the remainder of the field. One must remember that the object of using the benzoin is to remove all cutaneous gland secretion. To accomplish this, light swabbing is ineffectual. Reasonable force and friction must be used.

The benzoin having evaporated, another fresh sterile sponge is placed in the holder and the iodine is applied to the umbilicus. This sponge is then discarded, and with a new one the iodine is applied to the remainder of the field.

In executing this preparation the nurse should train herself to do it in a methodical and exact manner. After the navel has been cleansed with the iodine and the second sponge is secured, the nurse should cause the proposed line of incision to receive the first application of the iodine and then constantly work away from the site. Never paint the line of in-

cision, then on one side and then the other, finally giving the line of incision a last "dab" with the sponge, but apply the iodine to the line of incision first, and then avoid touching that area unless a new sponge is secured. A systematic plan is to cleanse the umbilicus, then discard the sponge, secure a fresh sponge, paint the line of incision, paint on both sides of this line, and then paint the pubes and thighs.

In emergency operations the preparation of the field consists of a thorough cleansing with benzine, after which iodine is employed and the drapings adjusted. Shaving is done, of course, when necessary, but no water should be used.

This method is now generally employed and is acknowledged as reliably efficient. There are some surgeons, however, who direct that after the iodine has been applied the field be gone over with 70 per cent. alcohol. A few operators are found who do not employ the iodine but are content with the use of 70 per cent. alcohol. Here and there one will also find a surgeon who remains content with the technique of several years ago.

#### DRAPING THE FIELD

The operative field having been rendered sterile, the patient is now ready for draping with sterile sheets and towels, which are so placed as to expose only as much of the field as may be required for the work to be performed. Two sterile sheets are used, one above and one below, and these should be sufficiently large to cover the patient's entire body and hang well down over the edge of the table. The edges of these sheets nearest the field are further protected by additional towels, or small sterile sheets, so that there remains exposed only the actual surface of the skin demanded for the operative attack. The towels or small sheets are fastened in place by means of safety pins or towel clamps (Fig. 37).

The foregoing technique having been rigidly observed, the surgeon may now begin his work, provided the patient is in a stage of complete anesthesia. If the stage of anesthesia has not been reached, or if the surgeon is not quite ready to commence the operation, it is desirable that the field be protected with a folded sterile towel until the actual operative work is begun.



## POSITIONS ON THE TABLE

A folded towel is used as a covering for the patient's head. It protects the hair and at the same time prevents the hair from annoying the anesthetist. The leggings (Fig. 33) are employed as a means of providing added comfort and warmth. Whatever rings or jewelry the patient may have been accustomed to wear are to be removed.

Because of the possible unconscious movements and struggles of the patient when in the excitement stage of the anesthetic, it is well to secure the patient's hands and limbs. This may be accomplished in several ways.



FIG. 34.—PATIENT ON IMPROVISED OPERATING TABLE.

The patient is dressed in a short nightgown and protective leggings. The hair is completely covered by a folded towel. The hands are held in place by a strap buckled around the wrist and passed under the patient's body to the other wrist. A bandage may be used instead of the strap. The legs are held in place on the table by a surcingle.

Usually the hands are tied at the side of the table by means of a strap (Fig. 34), a gauze bandage, or padded leather cuffs that come as a part of the table equipment. In fastening the hands, care should be exercised that the wrists be not too tightly constricted and the blood supply thus interfered with. Another precaution is to make sure that the elbows do not extend over the edge of the table; if they do, the weight of the arms, and also the weight of the surgeon or assistant leaning against them, causes considerable pressure upon the inner sides of the arms against the sharp edges of the table. This frequently will cause a paralysis of the musculo-spiral nerve, which may become permanent. At best it is very annoying because it may continue several weeks. The limbs should be restrained

by passing a surcingle over them and fastening it on the under side of the table (Fig. 34) or by tying the ankles to the foot of the table by means of gauze bandages.

Operative work in different regions and upon the various organs requires that the patient be placed in certain definite positions upon the table.

**Skull and Brain.**—Work in this region calls for the elevation of the head to an angle varying from twenty-five to forty-five degrees. The position is obtained by placing sandbags under the patient's shoulders, neck, and head, if the elevation cannot be secured by adjustment of the operating table.

**Goiter.**—In order that the thyroid gland may be thrown forward more prominently and to put the muscles of the neck on the stretch, a sandbag is placed under the nape of the neck and the head permitted to hang over this elevation (Fig. 35).

**Breast Amputation.**—A board, six or eight inches wide and long enough to reach beyond the arm when it is extended, is covered with a sterile covering and placed at right angles with the table and under the patient's shoulder. Upon it the arm is extended so as to give ample exposure of the axilla. In preparing this field, the axilla and the arm halfway to the elbow is prepared. The remainder of the arm and the hand is covered with sterile towels or a sheet, or is enclosed in a sterile gauntlet.

**Gall-bladder Operation.**—In order that the gall-bladder may be thrown into closer apposition to the anterior abdominal wall, a sandbag is placed under the patient's back. Modern tables have an elevating attachment to secure this position.

**Kidney Operations.**—For this work the patient is placed in the lateral prone position, and the kidney to be operated upon is thrown more into prominence and its approach simplified by placing a sandbag under the side of the patient, so arranged as to cause an elevation of the kidney area (Fig. 36).

**Trendelenburg Position.**—This position is required in practically all operations upon the pelvic organs approached by the abdominal route. By means of this position the bowels fall back into the upper abdomen and



FIG. 35.—PREPARATION FOR GOITER OPERATION.

The shield of sterile cloth stretched over a wire frame prevents the patient's mouth and the anesthetist's mask from contaminating the wound. The field of operation is clearly shown. A sandbag under the neck elevates the field of operation, which is draped with sterile towels.



FIG. 36.—PATIENT IN POSITION FOR KIDNEY OPERATION.

The patient's right arm rests on the far side of the table; the left arm is behind his back and is seen in the foreground of the picture. The area of operation is raised by a large sandbag under the patient's waist. This view shows the first sterile towels in place, ready to be covered by the laparotomy sheet and the final towels. The lower margin of the exposed field of operation, which will finally be surrounded by sterile towels, is indicated by the dotted line.

thus do not interfere with the surgeon's work. The position is secured by elevating the feet and the pelvis of the patient and by lowering his shoulders and head so that the body lies at an angle of approximately forty-five



FIG. 37.—PATIENT IN TRENDLENBURG POSITION.

For the improvised operating table a kitchen table and a smaller table were used. The lower end of the kitchen table was raised on blocks to give a better elevation for the Trendelenburg position.



FIG. 38.—MANY-TAILED ABDOMINAL BANDAGE IN PLACE AT THE COMPLETION OF A LAPAROTOMY.

degrees. Operating tables are constructed so that the patient may be thrown into this position; if such an operating table is not used, the position may be secured by the use of boards, blocks, or chairs as depicted (Fig. 37).

The true Trendelenburg position is one in which the feet and legs are

maintained in extension. There are some surgeons, however, who drop the feet and legs over the end of the elevation. The objection to this practice is that the flexing of the legs causes a rigidity of the abdominal muscles, which cannot be relaxed by the anesthetic. In this event the approach to the pelvic organs must be made through a rigid abdominal wall.

**Vaginal Work.**—The hips are brought down well over the edge of the table and the thighs flexed upon the abdomen. The lower legs are flexed on the thighs and held in place either by stirrups and holders, or by a sheet or bandage fastened around one knee and passed around under the neck of the patient and fastened to the other knee.

In these positions the draping of the patient is carried out as in the more common positions, and the draperies so placed as to expose only as much of the field as is necessary.

## CHAPTER VI

### DUTY OF THE NURSE DURING OPERATION

The patient anesthetized and the surgeon and his assistants ready, the time is at hand when, for a period of from fifteen minutes to two hours, the surgical nurse will be called upon to perform certain definite duties. The nature of these duties is predetermined, and familiarity with them will do much to expedite or retard the surgeon's work. To become a capable surgical nurse one must know not only what to do but how and when to do it, that the teamwork which is demanded and which should be enacted in every surgical operation may not be disrupted.

For an operation to proceed in an orderly manner there must be a definite division of labor. The operation and all its attendant factors must at all times be subservient to the surgeon, upon whom rests the responsibility of the operation and of all the acts of those who participate in the work.

The principals engaged in the work are, in the order of their importance and authority, surgeon, first assistant, anesthetist, second assistant, third assistant, surgical supervising nurse, scrubbed nurse or nurses, unscrubbed nurse, and orderly. For effective teamwork this is a sufficient number for an operating theater. For an operation in the home, however, the number of assistants must necessarily be limited, and in this case the nurse may be called upon to perform some of those duties assigned to the surgeon's medical assistant.

**The Surgeon.**—He is the recognized head of the group to whom all others are subservient and to whom they must accurately and conscientiously render their services. It is he who directs every detail of the work that is done.

**First Assistant.**—This assistant is the surgeon's immediate representative and the one who, in many instances, will superintend the carrying out of the surgeon's orders as well as to be of immediate aid to him in each



step of the operation. He anticipates the operator's desires and needs. During the actual operative work it is his duty to direct the assistants and nurses and indicate to them what is required from time to time as the work progresses. To him is frequently delegated the work of the final suturing of the wound and the application of the dressings.

**Second Assistant.**—The second assistant aids to the extent of seeing that the required instruments, needles, and sutures are promptly provided



FIG. 39.—THE OPERATIVE GROUP.

Note position of the two surgical nurses, one on each side of the table. The surgical supervisor stands in the right foreground.

for the surgeon as he may require them. He holds retractors so as to better expose the site of operative attack and sponges away the blood. In general, he is an assistant to the first assistant.

**Third Assistant.**—This person acts as an aid to the other two assistants, or he may assume the duty of the first surgical nurse. The third assistant performs the work of final sterilization and draping of the field.

**The Anesthetist.**—As the term implies, the anesthetist has charge of and administers the anesthetic selected by the surgeon.





FIG. 40.—OPERATIVE GROUP. LAPAROTOMY.



FIG. 41.—OPERATIVE GROUP. REMOVAL OF COCCYX.

**Surgical Supervisor.**—This assistant, customarily a trained nurse who has received special training in surgical nursing, is in direct charge of nurses engaged in the operation and is held responsible for their work.

The first and second clean nurses are the remaining important principals in the operating team. It will be the object of this chapter to enlarge

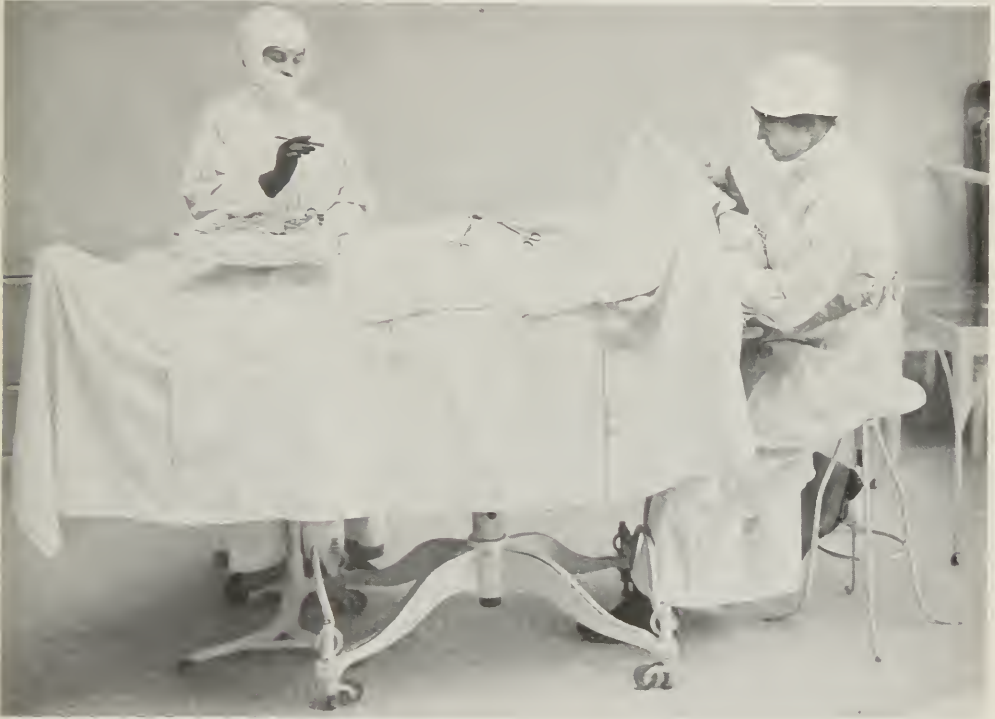


FIG. 42.—PATIENT PREPARED FOR LAPAROTOMY.

The instrument tray is in place and the nurse is holding the scalpel in readiness to hand to the surgeon. Notice the protecting screen between the patient's head and the operative field. This serves as a barrier to prevent contamination of the operative field from the mouth of the patient and anesthetist.

upon their duties and to describe in detail the methods whereby they may best perform their duties.

A word of caution as to a nurse's demeanor and manner of personal conduct during an operation may not be amiss. From a lay viewpoint, submission to a surgical operation is a serious procedure. Daily familiarity with surgical work has a tendency to render a nurse somewhat callous toward the feelings of those less familiar with surgical procedures.

To circumvent such a possible attitude the nurse must constantly strive to conduct herself so that her demeanor throughout the entire operation will be characterized by dignity. The laugh, the joke, the story, or a careless light-hearted attitude should never be indulged in by a nurse while so engaged. This does not imply that she should perform her duties with a mournful, oversanctimonious air but with dignified activity. The nurse should speak only when necessary and then in a low, distinct tone.

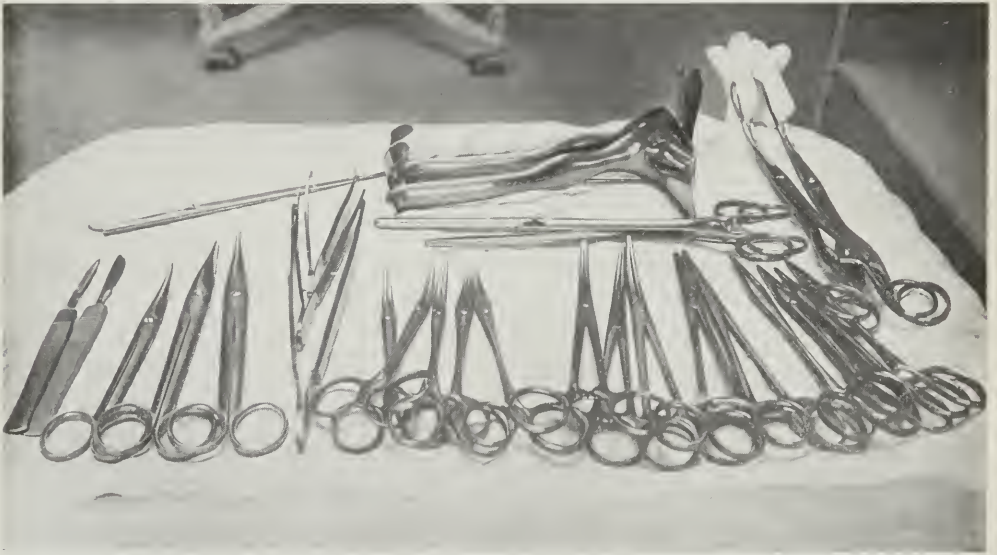


FIG. 43.—INSTRUMENT STAND WITH INSTRUMENTS ARRANGED.

Note two scalpels, three Mayo scissors, three tissue forceps, four Kelly curved hemostats, three Mayo curved hemostats, two straight Mayo hemostats, four straight Kelly hemostats, two sponge sticks with sponges, two clamps, two pairs retractors, a blunt dissector, and an appendical tucker.

An operation, except in a clinic, is not characterized by conversation. The best teamwork is done without conversation. Each participant is so trained as to anticipate his duty without waiting to be directed. The surgeon only is privileged to speak or carry on a conversation. Remember that every act determines the nurse's qualifications. Let your methods reveal training and perfection as well as a dignified demeanor.

The one word that may be selected to describe most fittingly the work of a clean nurse is anticipation. She must be ever alert to perform her duty and provide promptly for any emergency. To anticipate the wants

of the surgeon or his assistants and so minimize delay and annoying moments of waiting, should be the guiding motive of her technique.

It is well to familiarize yourself beforehand with the surgeon's preferences and customs. You will be conserving time by having an ample supply of needles and sutures ready for his immediate use. The instruments are to be arranged in classified groups and so placed that those in most frequent use will be within easy reach (Fig. 43). (See also Fig. 8, page 33.)

The following is a practical classification of instruments by groups:

1. Holding or seizing instruments: tissue forceps, tenacula, and retractors.
2. Cutting instruments: scalpels, scissors, chisels, cutting forceps, mallet, saws.
3. Control of hemorrhage: artery snaps, clamps, and ligature carriers.
4. Needles, sutures, and needle-holders.
5. Special instruments.

In considering the work of the surgeon and while assisting him one must remember that his operation is characterized by definite steps, and that these steps exist in practically every surgical procedure. They are, first, cutting through the overlaying structures to expose the part or organ to be operated upon. To do this the surgeon requires scalpels, scissors, tissue forceps, artery forceps, retractors, and sponges. These must, therefore, be ready and supplied to him as required, and it is the nurse's duty to see that they are at hand.

The seat of the lesion that called for surgical interference having been reached and exposed, the nurse anticipates the surgeon's next needs by handing to him or to his assistant such instruments, ordinary or special, as may be required to complete the work. For illustration: In an appendectomy, the abdominal cavity being opened, the nurse should have in readiness salt blocks or packing sponges to wall off the remainder of the abdomen. While the surgeon is delivering the appendix, the nurse prepares a ligature for tying off the mesoappendix. Next she has ready the intestinal needle threaded with silk or linen for the purse-string suture. This is followed by a small ligature to tie off the stump and a clamp for clamping the distal end of the appendix. The scalpel or cautery should be in readiness for severing the appendix, and also the "tucker." While the surgeon is returning the cecum to the abdomen and picking up the



peritoneum preparatory to closing, the nurse counts her sponges, packs, clamps, and artery forceps, and promptly reports whether they are accounted for. Then she hands to the surgeon the needle-holder which

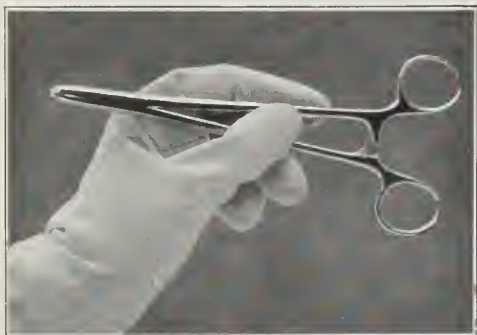


FIG. 44.—STANDARD MAKE OF NEEDLE-HOLDER. PROPER WAY TO HOLD IN HANDING TO SURGEON.



FIG. 45.—NEEDLE-HOLDER WITH LARGE FULL-CURVED NEEDLE THREADED WITH SILKWORM GUT. FORCEPS ATTACHED FOR TENSION SUTURE.

This shows the proper manner of holding the forceps when handing to surgeon. Note that the suture, when threaded in needle, is twisted two or three times.



FIG. 46.—HAGEDORN SABER-POINTED NEEDLE IN NEEDLE-HOLDER AND THREADED WITH CATGUT READY TO HAND SURGEON FOR SUTURING MUSCLE OR FASCIA.

contains the needle and suture for closing the peritoneum. Next there are in readiness several silkworm-gut sutures (Fig. 45) and in turn the catgut for closing muscle, fascia, and skin (Fig. 46). Finally, the dressings are given to the assistant for covering the wound.

This reveals the manner in which the alert nurse anticipates the needs of the surgeon. Equal proficiency should be revealed in every operation, whatever its nature.

We have outlined the general plan of work of the scrubbed nurse. There are, however, certain finer points that a nurse must observe in order that she may secure pronounced efficiency and greater definiteness of purpose in her operative work. Some of these finer points of technique are acquired naturally, while others are acquired only after weeks of persistent study, observance, and practice. Persistent attention to details will alone enable her to possess them. While they may be described to a certain extent, it is impossible to give specific directions, and a nurse is therefore compelled to resort to her own ingenuity to acquire them in the performance of her surgical work. So far as possible we will advance general principles and suggestive ideas as to the salient features of this perfected technique.

#### INSTRUMENTS

Be sure that every instrument is in perfect working order; if it is not, discard it.

An instrument once used is to be discarded, provided a sufficient number of the same kind are available.

If an instrument is laid down and the surgeon intends to use it later on in the operation, see that when he again needs it all stains have been removed. This may be accomplished by wiping with a moist sterile sponge.

For cutting sutures do not use scissors that are to be used for cutting tissue. Have one pair of scissors on your supply table for your suture cutting.

Always provide at least six artery snaps within easy reach for immediate use. Let the close of operation find your instrument tray and table in as orderly arrangement as when operation was commenced. The same orderliness should be maintained during the entire procedure.

You should know the name of every instrument that is used. It will require constant study to possess this knowledge, for styles and forms of instruments are constantly changing.

Before an abdominal incision is closed be sure that all your clamps and artery forceps are accounted for.

Instruments held in reserve should remain covered with a sterile towel until called into use. This protection should never be omitted.

#### SUTURES AND NEEDLES

The methods of suturing most frequently used are the continuous, glover's, interrupted, tension, Lembert, and everting.

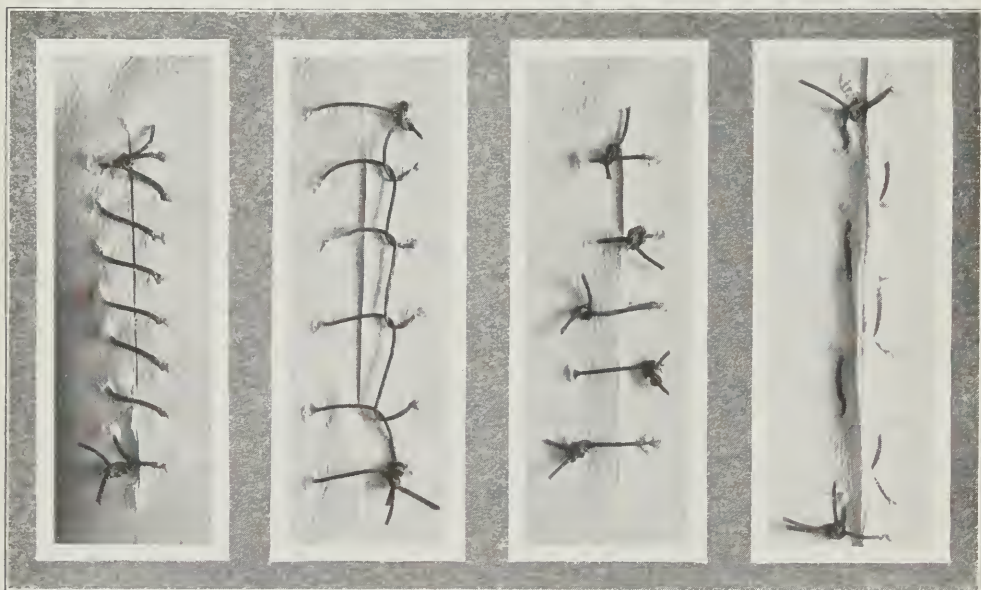


FIG. 47.—Continuous. FIG. 48.—Glover's. FIG. 49.—Interrupted. FIG. 50.—Everting.  
METHODS OF SUTURING WOUNDS.

The continuous is, as its name implies, a continuous or running suture extending the entire length of the wound (Fig. 47).

The glover's is a continuous suture in which each stitch consists of a separate binding hitch (Fig. 48).

The interrupted is one in which each stitch consists of a separately tied suture (Fig. 49).

The everting is so placed as to evert the raw edges of the wound (Fig. 50).

The tension is usually of silkworm gut and is interrupted. To prevent cutting into the tissue it is frequently tied over a roll of gauze (Fig. 51).



The Lembert is principally used in intestinal work. The suture is carried through the intestinal wall to the mucous coat and outward to the surface and then through the opposite intestinal wall in the same manner. It is then tied.

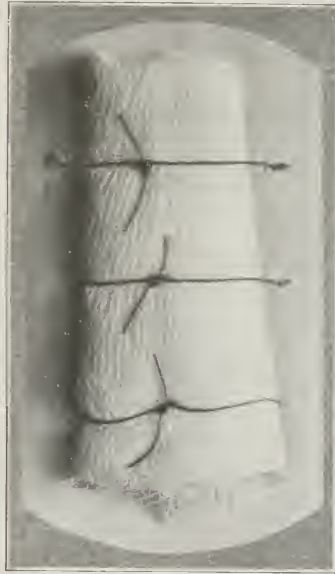


FIG. 51.—TENSION SUTURE TIED OVER ROLL OF GAUZE.

Test every suture before threading it in the needle (Fig. 52). In doing so do not use force beyond that which the suture is supposed to withstand.



FIG. 52.—TESTING A LIGATURE BEFORE HANDING TO THE SURGEON.

Catgut sutures may be made more pliable by immersing in alcohol or by dipping for a moment in a saline solution. Annoying knots and tangles may be thus prevented.

No. 1 catgut is of ample size for tying small bleeding vessels. No. 3 is of sufficient size for the ordinary larger vessels. No. 3 is customarily used for tying off the mesoappendix and in tying the vessels of the broad ligaments. As a rule, each surgeon has a preference as to the size of suture he wishes for certain uses and will indicate this preference before beginning the operation if you ask him.

Needle sizes and styles to be used will vary according to the surgeon's custom. Needles are usually carried in his instrument kit. The nurse must exercise care to the extent that every needle handed to the surgeon is sharp.

Needles threaded with silkworm gut should have a forceps attached.

Needles and sutures threaded before the operation should be protected with a sterile towel.

#### OPERATIVE FIELD

The drapings of the operative field may become badly soiled several times during the course of the operation. The nurse must ever be alert to replace soiled drapings with clean towels. It may be done without interfering with the work of the surgeon or his assistants. Soiled or not, when the surgeon is ready to close, the field should be surrounded with fresh towels.

#### SPONGES AND PACKS

Always have immediately available at least three sponge sticks with sponges (Fig. 53).

Regulate size of your sponges according to the size of the wound and the purpose for which sponge is to be used.

A sponge used once is to be discarded and replaced with a fresh one.

Accurately ascertain the number of sponges you have when the operation is commenced and have some one check your count. At the close of the operation and before the wound is sutured, be sure that every sponge is accounted for and that the same individual checks your final count. This precaution holds true of packs.

Walling-off packs, salt blocks, or strips are used either moist or dry as the surgeon prefers. When used moist they are wet in normal saline at a



FIG. 53.—SPONGE IN SPONGE STICK, READY TO HAND TO SURGEON.



FIG. 54.—LARGE SPONGE, UNFOLDED.



FIG. 55.—LARGE SPONGE FOLDED FOR USE AS A SMALL SPONGE IN THE SPONGE STICK.

temperature of  $100^{\circ}$ . Packs covering exposed coils of intestine should be frequently changed so that the bowel does not become chilled. Attach a forceps to every pack that is in use (Fig. 57). Sponges in the abdomen should always be held in sponge holders or have forceps attached to them.

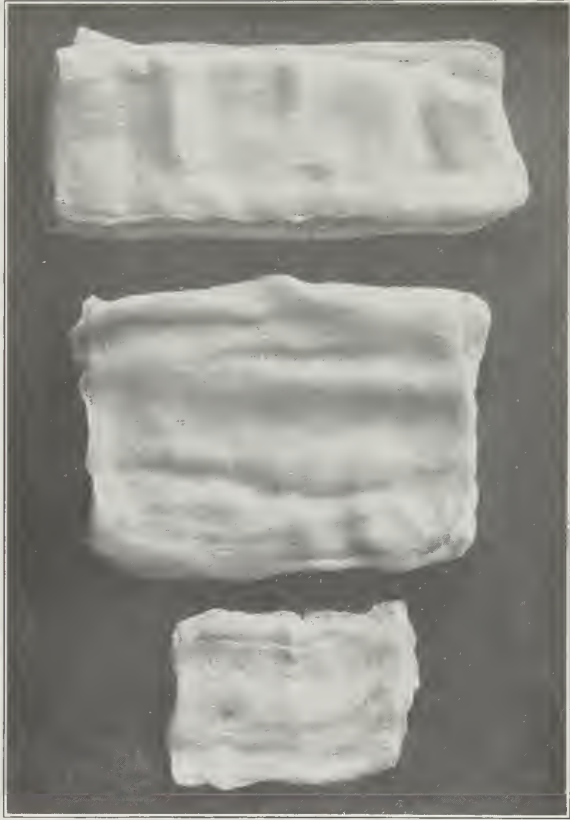


FIG. 56.—GAUZE SPONGES.

The oblong sponge, used either on or off a holder and sometimes called a wipe, is made from gauze which measures about 9 by 16 inches. After folding, the sponge is about 2 by 6 inches. For making the square sponge used in the sponge stick, a piece of gauze 16 inches square is required. After folding, the sponge measures 4 by 5 inches. To make the small sponge use gauze 9 inches square.

### DRAINS

The kinds of drains in common use are:

Gauze, varying from a half to four inches in width and either plain, iodoform, carbolized, or bichlorid. The plain and the iodoform are the kinds most frequently used. They are made in yard lengths (Fig. 58).



FIG. 57.—SALT BLOCK AND PACKING WITH CLAMPS ATTACHED.

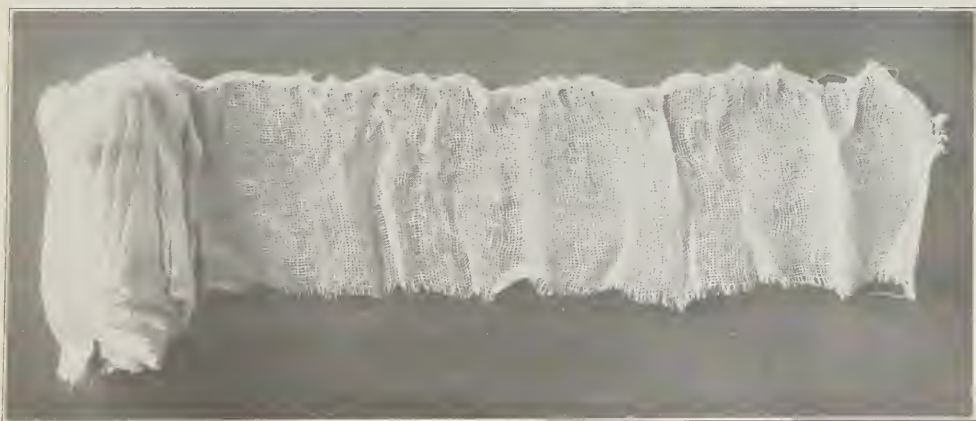


FIG. 58.—TWO-INCH GAUZE DRAIN OR PACKING.

For photographing, the drain was taken from a sterile package and one end unfolded to show the width. The drain is cut in yard lengths, and folded back and forth upon itself before being placed in a wrapper for sterilizing.

Perforated rubber tubing of various sizes (Fig. 59).

Split rubber tubing within which are placed several lengths of gauze (Fig. 59).

Cigarette drain, made by taking several strands of gauze and wrapping with several turns of gutta-percha or rubber tissue (Fig. 59). Manufac-



FIG. 59.—RUBBER DRAINS.

Perforated rubber tube, split rubber tubing with several lengths of gauze, cigarette drain of rubber tissue with gauze inserted.



FIG. 60.—SILKWORM-GUT DRAIN.

turers now supply thin rubber tissue of several sizes so that it is only necessary to pull the gauze through this thin tubing. This avoids the necessity of rolling.

Silkworm-gut drain, consisting of ten to fifteen strands of silkworm-gut sutures (Fig. 60).



## DRESSINGS

Various solutions and powders were formerly employed to bathe or dust over the wound. As a rule they are today abandoned. The suturing completed, the skin is cleansed from blood by means of a moistened sponge, dried, and sometimes painted lightly with iodine. Dry dressings of gauze are then applied. Some seal a clean wound with collodium.



FIG. 61.—DRESSING MADE FROM PIECE OF GAUZE 8 BY 20 INCHES.



FIG. 62.—ABDOMINAL PAD.

The gauze so used is cut a sufficient size to amply cover the wound. The gauze is maintained in position by means of adhesive strips, tapes, binders, or bandages.

## ABDOMINAL DRESSINGS

Cover the wound with five or six pieces of dressing (Fig. 61). Place the first layers on each side of the incision to protect the skin from cut



ends of sutures (Fig. 63). Hold in place with inch strips of adhesive that fasten the upper and lower ends of the dressing (Fig. 64). Cover this with an abdominal pad (Fig. 62) held in place with adhesive tapes (Fig. 65).



FIG. 63.—FIRST WOUND DRESSINGS. STRIPS OF GAUZE ON EACH SIDE OF INCISION TO KEEP THE ENDS OF CATGUT FROM THE SKIN.



FIG. 64.—FIRST DRESSINGS, HELD IN PLACE BY STRIPS OF ADHESIVE.



FIG. 65.—ABDOMINAL PAD HELD BY ADHESIVE TAPES.

Cover all with a Scultetus binder (Fig. 67). If drainage is employed, fluff gauze around the drainage material and do not apply too snug a binder.

Dressings of the head, face, chest, or extremities are maintained in position by adhesive or bandages.

Wounds of the back are dressed the same as abdominal wounds.

In major amputations see that the stump is well protected by a sufficient quantity of dressings and cotton pads.



FIG. 66.—SCULTETUS BINDER.

In breast amputations the axilla should be well padded.

In dressing scalp wounds pad back of the ears and then envelope the entire skull with a roller crown bandage.

If splints or plaster casts are used always provide sufficient padding over bony prominences and for the heel, axilla, and popliteal space.



FIG. 67.—SCULTETUS BINDER IN PLACE AT THE COMPLETION OF A LAPAROTOMY.

If an eye is to be covered see that plenty of cotton is used.

Never leave skin in contact with skin. Always provide abundant padding.

The operation completed, the final dressings in place, and the patient in bed, the nurse's first duty is to attend to the preservation or disposal of

the pathological specimen or part that was removed, according to the surgeon's instructions. This done, the instruments should be cleansed and the room dismantled. Of course, if one acts in the dual capacity of surgical nurse and nurse to the patient during convalescence, it will often be impossible to leave the patient immediately to perform this work. The anesthetist frequently remains with the patient for some time and, in this event, the opportunity may be seized to begin the work of cleaning up.

In reviewing your work as a surgical nurse, keep in mind two points: first, to anticipate the requirements of the surgeon and his assistants; and second, to conduct your work by a systematic plan. Time is required to attain an advanced degree of perfection, and the nurse must ever remain studious and active in keeping herself informed regarding the most recent developments in surgical methods.

## CHAPTER VII

### POST-OPERATIVE NURSING DURING THE FIRST TWENTY-FOUR HOURS

The operation over, dressings and bandages in place, the nursing care given a patient will be an important factor in determining the ultimate operative result. The alert attentive nurse can do much to influence favorably the patient's convalescence and add to his comfort.

The first forty-eight to seventy-two hours will be the most trying and demand more or less of the nurse's time, depending upon the nature of the operation and the anesthetic employed. The patient does not fully rally from the depressing systemic effect of the operation and reaction is not completely established until the second to the fourth day. Patients often speak of these two or three days as a "dream" and recall but indistinctly what transpired or how they conducted themselves. In spite of this depression, their comfort must be conserved and such care administered as will enable them to pass through this period, which inaugurates their first stage of return to health, in the best possible manner.

Before returning the patient to bed a dry, warmed, fresh nightgown should be put on him. During an operation a patient frequently will perspire profusely and his gown become wringing wet; again it may become soiled. At any rate he is to be robed in a clean gown. Before doing this the body should be thoroughly dried. If the leggings are wet or soiled, they are to be changed. The patient is now ready for bed. The time consumed in the foregoing work should be as brief as possible and every precaution taken to prevent chilling.

**The Bed.**—If the nurse assisting in the operation is to assume the after-nursing of the patient, she will, before scrubbing up, arrange for some one to prepare the bed according to her directions while she is engaged in assisting the surgeons.

A comfortable bed depends upon a good mattress and springs. These should be covered with a pad and a waterproof cloth (Fig. 68). These

in turn are followed by a sheet and a drawsheet (Fig. 69). The covering for the patient consists of a sheet, a woolen blanket or comforter, and a spread. Do not commit the error of using several heavy blankets. If

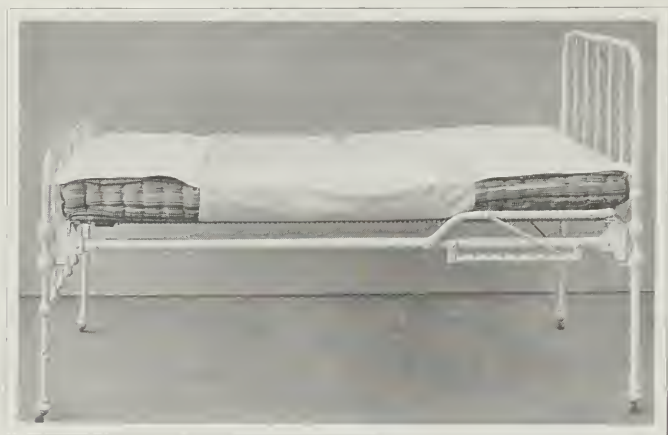


FIG. 68.—MATTRESS, MATTRESS PAD, PROTECTIVE RUBBER DRAWSHEET.

necessary a light woolen blanket may be used temporarily over the spread. The under sheet should be covered with several hot-water bottles (Fig. 70)



FIG. 69.—UNDER SHEET AND DRAWSHEET IN PLACE, COVERING MATTRESS PAD AND PROTECTIVE RUBBER DRAWSHEET.

and the covers drawn over (Fig. 71) so that the bed will be thoroughly warmed before the patient is placed therein.

Unless contraindicated, the patient should be laid upon his back. The water bottles are allowed to remain in the bed, but the nurse must

be alert to keep them at least *ten inches from the patient's body*. Should unconscious movements or tossing occur the nurse must exercise extra care to prevent burns. The pillow is dispensed with during the first few

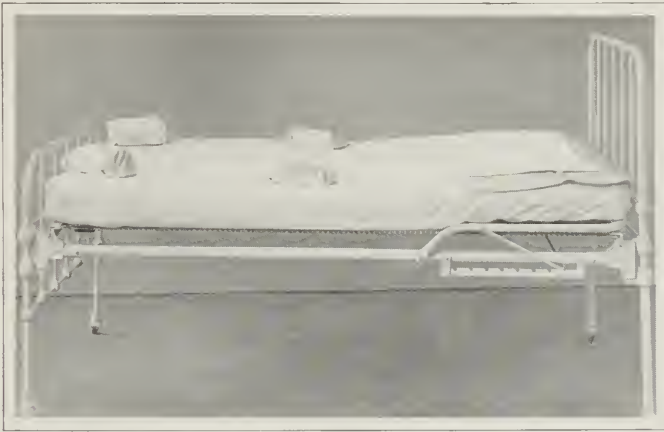


FIG. 70.—BED WITH HOT-WATER BOTTLES IN PLACE. NOTE RUBBER PROTECTIVE SHEETING AND TOWEL AT HEAD.

hours except for patients with spinal deformity and the shoulder curvatures of advancing age. The head is turned to one side and rests on a



FIG. 71.—BED READY FOR PATIENT; WARMED AND KEPT WARM WITH HOT-WATER BOTTLES.

towel covering the under sheet. A vomitus basin and two or three towels must be within easy access.

**The Room.**—The temperature of the room should be  $75^{\circ}$ , and fresh air supplied in abundance but not directly upon the patient. A bright



light should not be admitted, and quiet is to be insisted upon throughout the entire house. The patient must not be left alone until fully conscious.



FIG. 72.—ELEVATION IN ABDOMINAL DRAINAGE CASES.



FIG. 73.—ELEVATION DEMONSTRATING PILLOW PINNED TO BED UNDER THE BUTTOCKS AND PILLOW AT FOOT TO PREVENT SLIDING.

**Elevation of the Head of the Bed.**—In operative abdominal work involving the pelvis and lower abdomen where drainage is employed, the head of the bed is frequently elevated from six to twenty-four inches.

The object of such elevation is to cause fluids and pus to gravitate to the lower abdomen and pelvis. It has been demonstrated that the pelvic peritoneum and that of the lower abdomen can better withstand and care for infectious organisms than the upper abdominal peritoneum. By keeping the patient in an elevated position spreading peritonitis is limited in a vast majority of instances. Drainage by gravity is another reason for the employment of this position, especially in vaginal drainage through the posterior cul-de-sac.

The position is secured by using bricks or blocks of wood under the legs of the head of the bed and by removing the casters from the foot (Fig. 72). Chairs may also be employed for this purpose.

To overcome the tendency of the patient to slide to the foot, several devices are recommended. Of all such devices the most satisfactory and simple is to pin a pillow securely to the mattress just below the buttocks (Fig. 73). A foot support of pillows or an ordinary footstool is an additional aid.

Another method consists in the use of a cradle sling that passes below the patient's buttocks and is fastened around or to the headboard.

The elevated position is maintained for a period of three to fourteen days, depending upon the condition that indicates its employment. During the first one or two days patients frequently complain of this unnatural position. They soon accustom themselves to it, however, and experience no great discomfort or loss of sleep.

**Fowler's Position.**—This is an exaggerated elevation of the patient's head and trunk so that he assumes practically a sitting posture. In this position the patient's body is supported at an angle of slightly more than forty-five degrees by a back rest and a cradle sling, the pelvis being the lowest point. Fowler's position is indicated in peritoneal infections where drainage is used. It is frequently employed in stomach resections, gastro-enterostomies, intestinal anastomoses, and in peritonitis arising from any source.

**Elevation of the Foot of the Bed.**—This position is secured by placing bricks or blocks under the legs of the footboard and raising it to the desired height. A pillow is placed against the headpiece to prevent discomfort to the patient's head from resting constantly against the headboard.

Elevation of the foot of the bed is employed in shock and collapse with severe loss of blood. The position is contraindicated if drainage of the lower abdomen has been employed.

The employment of mechanical restraining devices for delirium is but a confession of one's lack of familiarity with modern methods. Delirium, even of severe type, may be readily controlled by hydrotherapy and elimination.

A patient recovering from an anesthetic should not be encouraged to change his position frequently during the first twelve hours. After that time he may be allowed to lie upon either side. The pain in the wound occasioned by changing to a new position may cause a patient to object, but his objections may be overcome by assuring him that after he is in the new position the wound pain will immediately disappear.

One of the most trying conditions that a surgeon and a nurse have to contend with is the patient's complaint of post-operative backache. It is the result of two causes, the patient's position on the table and the relaxation of the spinal muscles produced by the anesthetic. While on the table the normal curvature of the spine is considerably lessened by relaxation of the support offered by the spinal muscles. This throws a strain upon the intervertebral ligaments which reflect the strain to which they have been subjected by causing a most annoying and disturbing backache, persisting from one to four or five days.

This backache may be prevented or greatly lessened by having the operating table covered with a heavy padding six to eight inches in thickness. We are accustomed to use a six-inch hair mattress on the operating table, and its prophylactic effect has been demonstrated by the patient's freedom from this distressing backache. Some hospitals have plaster molds to support the hollow of the back and so relieve these ligaments of the strain to which they would otherwise be subjected. The back may also be supported with pillows.

When this condition occurs the only relief that can be secured is from massage and frequent change of position. Morphin or codein is indicated to induce sleep and thus bring relief from the "ache."

Following an abdominal operation the extension of the limbs causes

tension upon the abdominal recti muscles, which produces an exaggeration of the pain in the abdominal incision. It may be relieved by elevating the knees and permitting them to rest on one or two pillows (Fig. 74).

In amputations of limbs, in fractures, or in other operative work upon the extremities additional comfort is secured for the patient if the involved limb or stump be elevated by means of a pillow.

In passing from the subject of the patient's bed and his posture therein, let me add that the nurse may, by many little attentions, secure additional comfort for the patient. Above all, keep the bed clean, the covers arranged, and a general appearance of tidiness.



FIG. 74.—TENSION ON ABDOMINAL MUSCLES RELIEVED BY ELEVATION OF KNEES OVER FOLDED PILLOW.

**Returning Consciousness.**—A person recovering from an anesthetic should not be left alone until fully conscious. During the return to consciousness and even before, the relaxation from the anesthetic may cause swallowing of the tongue or a dropping of the jaw (Fig. 75), either of which will cause obstruction to breathing and, possibly, asphyxiation.

Again, nausea or vomiting may be attended with inspiration of the vomitus, producing laryngeal spasm with serious possibilities of choking, or later, of inspiration pneumonia. Upon the patient's return to bed the mouth is to be cleansed of all mucus, and the head turned to one side. The respiration is to be kept free from all obstruction.

As the conscious state approaches there may be one or two attempts to vomit, or vomiting of stomach contents or swallowed mucus may occur. If the preoperative preparation has been thorough and the anesthetic

skillfully administered post-anesthetic vomiting will be much lessened. In spite of every precaution severe vomiting is at times encountered. To insure greater freedom from nausea or vomiting some anesthetists are accustomed to perform a gastric lavage before the patient leaves the table (Fig. 76). If this practice is observed a stomach tube, a mouth gag, and one or two quarts of warm normal saline will be required.

If vomiting occurs the nurse must support the patient's head, holding



FIG. 75.—RECOVERING FROM ANESTHETIC.

Supporting jaw of unconscious patient. Head turned to side; no pillow, towel to protect bedding; additional light blanket thrown over the bed for added warmth. On the table are shown hypodermic, glass sterile water, sponges, towels, vomitus basin.

it to one side, and with a sponge or towel cleanse and free the mouth of all vomitus. In severe retching following abdominal operations, pain caused by straining may be lessened by supporting the abdomen with gentle pressure of the open palm over the dressings.

After one or two periods of vomiting the patient will continue in a semiconscious state and be more or less listless. If he should attempt to roll or toss about, he should be restrained by reasonable force.

An hour having elapsed, the patient should be well out of the effects of the anesthetic. These first moments should find the nurse in attend-



ance, for her presence is of assuring comfort to the patient. When the patient is capable of understanding, the nurse may well tell him that the operation is over, that he is back in bed, that everything progressed satisfactorily, and that he is to remain quiet and endeavor to sleep.

At this stage the patient will not experience much if any pain, as the



FIG. 76.—GASTRIC LAVAGE.

Requirements: Two pitchers, vomitus basin, towels, gauze, stomach tube, mouth gag, jar. Note protection of bed with towels and rubber sheeting. Patient's head brought to side of bed. Nurse pouring lavage solution into stomach tube.

preanesthetic opiate and the anesthetic still serve to cover sensibility to pain. The patient will, if encouraged, fall into a slumber that may last from one to two or more hours.

During this period careful watch must be kept of the pulse, respiration, and general appearance. After the lapse of one or two hours, failure of returning consciousness, with a feeble, rapid pulse, shallow respiration,



and pale or blue appearance warrants prompt institution of methods of resuscitation. The only exception is in those patients who have had one to three preoperative doses of scopolamin or hyoscin without, or combined with, morphin. Such patients may sleep for six to eight hours after an operation.

After a slumber varying from a half to two hours the patient will complain of thirst or dryness of the mouth and throat. Formerly water was denied for twelve to twenty-four hours. Now it is a common practice to permit drinking of small quantities of water at frequent intervals provided no operative work upon the stomach contraindicates its administration. True, the water first taken may be vomited in a few moments. This is really to be welcomed for it then serves as a gastric lavage, and the water subsequently given is retained.

If vomiting occurs every time water is taken, all liquids should be withheld until the stomach is capable of retaining fluids. Persistent vomiting is an imperative indication to withhold all fluids. In the intervals the patient is allowed frequently to rinse his mouth and moisten his lips. Drugs are of little value in controlling vomiting. While many and various measures are advanced to control stomach irritability, the most satisfactory and efficient is absolute rest of the stomach. If vomiting is not controlled in eight to twelve hours or if it increases in severity, other treatment must be instituted. The condition then becomes a surgical emergency.

The patient will soon begin to complain of being in an uncomfortable position or of a tired back. A pillow, if desired, may now be given and added comfort secured by placing a pillow under the knees. Even with this attention evidence of restlessness will again soon appear and endure for a period of time. The patient will ask as to details of the operation. He may become very talkative; fretting, or even hysterical manifestations may be shown. It is well for the nurse to analyze her patient's actions and to endeavor to control them by encouragement and reasoning. Familiarity with a patient's disposition will be of value in meeting these conditions.

**Pain and Rest.**—After a lapse of a few hours the pain occasioned by

the wound will become evident. In some patients the pain is severe, while in others it will occasion little or no comment. If the restlessness and pain are mastering the patient it is justifiable to administer the ordered morphin in dosage of an eighth to a quarter grain hypodermatically. One should never permit a person to suffer unnecessarily. Morphin should be administered judiciously; it prevents exhaustion, conserves strength, and induces beneficial rest. Usually the indications will be to repeat the dose in four to six hours and again in the evening and possibly toward morning. Do not give it unless indicated, but when indicated do not hesitate to give it. Of course, we realize that it has a constipating effect and may cause subsequent meteorism and difficulty in moving the bowels, but if employed with judgment these objections may be ignored. Codein is sometimes substituted. One must remember that codein will produce rest but has little effect on real pain, and, even if used, one will have to resort to morphin to attain the desired effect. Codein may well be employed after the second day if such a remedy is required and simpler measures are unavailing.

Frequent bathing of the hands and face with cool water produces relaxation and comfort. Toward afternoon and in the evening an alcohol rub will be refreshing. A cold compress placed over the forehead and eyes is often agreeable. One should not neglect to change or shake up the pillows frequently and secure a change of the patient's position.

**Catheterization.**—One need not worry or become anxious because the patient does not express a desire to urinate during the first eight, ten, or twelve hours. Some will even go for a longer period without danger or discomfort. As a rule, the patient is to be urged to urinate in ten or twelve hours. If unable to urinate and no discomfort is expressed, a patient may be permitted to go several hours longer before catheterizing. The only exception to this rule is in hysterectomies and bladder operations, when the bladder must not be permitted to become distended. Kidney secretion is always diminished during the first twenty-four hours.

**Nourishment.**—In addition to the water that is given the patient to drink but little nourishment is to be permitted. Toward late afternoon or evening a cup of plain hot tea will do no harm and will be grateful. It



may be repeated later on in the evening. A glass of orange or lemon albumin may also be administered. On the whole, nourishment should not be urged and when desired or requested it is to be given in guarded quantity. An abundance of water is all that is really indicated at this time. Above all things be sure that you understand the surgeon's orders regarding water and nourishment, and if they are not clear ask him to give you explicit instruction as to what course you are to pursue.

**Salines.**—It is customary to order a normal saline by the rectum during the first twenty-four to forty-eight hours in all major operations. This procedure is not dependent upon the patient's general condition as an indication for its administration. It is becoming more and more a routine measure of considerable merit, as it supplies the body with necessary fluid and has a beneficial general systemic influence. It may be administered by a continuous drop proctoclysis (Fig. 77) or in quantities at stated intervals.

A satisfactory method is to administer eight to twelve ounces as soon as the patient is placed in bed and repeat every six hours. The precaution to be observed is not to ad-

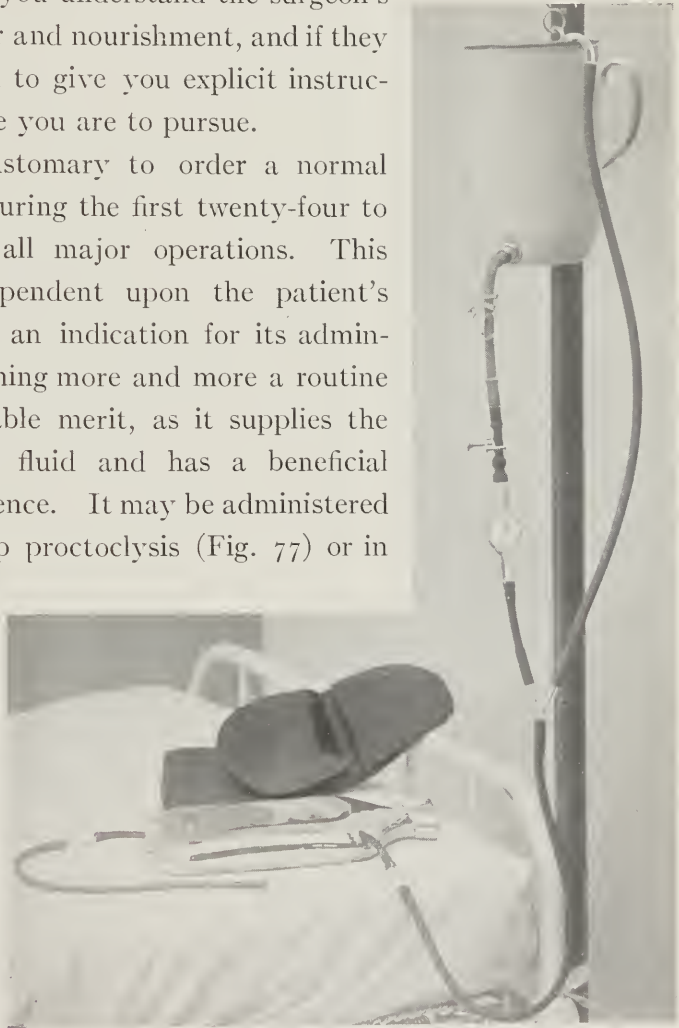


FIG. 77.—APPARATUS FOR CONTINUOUS PROCTOCLYSIS (MURPHY DRIP).

This apparatus consists of an especially constructed glass nozzle through which the drops can be seen, a screw compressor above the glass nozzle for regulating the rapidity of the drops, a return-flow tube which is attached to the solution container by a glass U tube for the escape of gas from the bowels, a glass Y tube for attaching the solution tube and the return-flow tube, and a metal solution heater which rests upon the bed. A felt cover is provided for the heater when in use, but for the photograph it was removed to show how the tubing passes through the metal heater.

minister a larger quantity at one time in hysterectomies or in plastic work upon the vagina or rectum, even though a patient may be able to retain such larger quantities. When the patient can take large quantities of water by mouth, the rectal salines may be discontinued.

**Medication.**—Very little medication will be indicated during the first day. Strychnin, grain  $\frac{1}{40}$ , is almost always ordered to be given hypodermatically every three or four hours. It serves to keep up general systemic tone; further than that it is of but little value. Digitalin is ordered by some surgeons. If a cardiac stimulant or support is indicated, the most satisfactory remedies are camphor oil and whiskey.

If the patient perspires freely and continues to do so, atropin, grain  $\frac{1}{150}$  to  $\frac{1}{75}$ , is administered to prevent the loss of water from the system.

**Temperature.**—In normal recoveries the temperature receives but little consideration during the first day. It is well to record it at three-hour intervals commencing at three or six in the afternoon. A rise in temperature of one-half to two degrees may be recorded during the first or second day without occasioning alarm. In wounds that are not draining, a temperature of  $104^{\circ}$  or over should be reported.

After draining abscesses or in removing decomposing remnants of impregnation from the uterus, the patient may experience a severe chill from two to six hours after her return to bed. This chill may last from fifteen minutes to one or two hours, and may be followed by a rapid rise in temperature so that shortly after the chill a temperature of  $103^{\circ}$  to  $105\frac{1}{2}^{\circ}$  may be recorded. The condition is caused by absorption through new avenues, occasioned by the operation; as a rule the temperature will drop to near normal in a few hours.

If patients suffer from chill, they should be covered with warm blankets and surrounded with hot-water bottles. A hot drink is also indicated. The chill passed, the rising temperature after it reaches  $103\frac{1}{2}^{\circ}$  is to be controlled, if persistent, by tepid sponging. In certain instances the invasion of the general system by this sudden inpouring of toxic products will occasion serious and alarming heart action and collapse. In this event active stimulation with whiskey, camphorated oil, and normal salines must be promptly employed to overcome the depressing effect.



**Pulse.**—The pulse is our best indicator of the patient's condition. Close study of the pulse will impart reliable information and tell us what may or may not be necessary. Volume, rhythm, character, and rapidity must be noted when taking the pulse.

A pulse of small volume and strength must be watched. If its character does not improve in a reasonable length of time suitable treatment should be promptly instituted. This same caution should be observed in a full, bounding pulse of high tension. An irregular rhythm must also receive the nurse's careful watching.

The rapidity of the pulse is of less moment provided it is of good volume, character, and rhythm. A pulse of 80 before operation may rise twenty or thirty beats without creating any concern. A pulse that registered 100 before operation may be counted at 120 or 130 afterward and remain so for several hours without exciting the least alarm. As a rule, a post-operative rise of pulse of twenty to thirty beats and its persistence for two or three hours is a normal occurrence. Usually it will become gradually less rapid and fall within bounds after the lapse of an hour or two. If the pulse-rate does not diminish, the reason should be investigated. In every instance due heed must be given to the patient's appearance and general condition. After certain thyroidectomies there will be a sudden rise of pulse to 160 or 180. Recently I observed after a thyroidectomy a patient whose pulse could not be counted for several hours on account of its rapidity. The general condition was reassuring, however, and after six hours of such rapid action it gradually fell within bounds.

On the whole, the following is an excellent guide: A pulse of 120 requires watching; a pulse of 140 requires anxious watching; a pulse of 160, if not reduced in six hours, foretells impending death.

During the first hour after the return of the patient to bed the pulse should be taken and recorded every ten minutes; during the second hour every fifteen minutes provided consciousness has returned; every fifteen minutes for the third hour; half-hourly thereafter for the next six hours; and hourly during the remainder of the first twenty-four hours. If conditions are unsatisfactory the nurse must make frequent examination of



the pulse and note its character and quality and duly record them. Very often such frequent taking of the pulse will awaken suspicion and alarm in your patient's mind, and he promptly concludes his heart is not strong or that he is in a serious condition. It is always well to inform the patient that this frequent taking of the pulse is a routine practice. By so doing you will forestall unnecessary alarm or worry on the part of the patient.

Study and years of close observation will find you more capable of interpreting the heart and its action as evidenced by the character, volume, rhythm, and rapidity of the radial pulse.

**The Chart.**—Your nursing record for the first day should contain the following information for the surgeon:

**PULSE.**—Record of its rapidity, character, volume.

**RESPIRATION.**—Hourly record of its frequency and character.

**TEMPERATURE.**—Its height at 3, 6, 9 p.m. and 12 midnight, if awake.

**CHILL.**—If a chill occurs the temperature is to be taken at once and half-hourly thereafter until the temperature reaches its maximum and begins to fall.

**MEDICATION.**—A full record of all medicines given and the time administered. (If morphin is administered have the surgeon initial each record of it as required by the Harrison law. This holds true of all opium or cocain preparations.)

**REST.**—Record the amount of time the patient slept.

**URINATION.**—Record the number of ounces voided and whether it was voluntary or by catheter.

**WATER and NOURISHMENT.**—Chart the amount consumed and note whether nausea was present and if vomiting occurred.

**COMMENTS.**—Note the patient's general condition and actions.

**DETAILS OF OPERATION.**—Surgeon, his assistants, names of all principals engaged in the operation, and of witnesses. What anesthetic was given, when started, and when withdrawn. When the operation was begun and time completed. What was done. Note disposition of pathological specimens and tissues removed during operation. Condition of patient when returned to bed.

Make the chart more than a record of a few figures and meaningless comments. Make it demonstrate that you have been alert to everything that has transpired, and let it convey to the surgeon a complete report of his patient's condition and progress during every moment of his absence.

**Friends and Relatives.**—The patient's family and friends usually are intensely interested in the condition and progress and will be desirous of going into the sickroom frequently to allay their fears. It is here that a nurse will be called upon to exercise considerable tact and judgment. Quietly but firmly impress them with the fact that the patient's recovery is partly dependent upon his being kept quiet and undisturbed. The most intimate relatives may be admitted to the room after the patient is

in bed, and then requested to retire when the early signs of returning consciousness are manifested. When the patient is fully conscious they may be admitted again for a moment to speak a few words of encouragement. None but the immediate family should be admitted; friends should be denied entrance until convalescence is well established. No rule as to visitors can be laid down; circumstances must guide the nurse in determining when they may be permitted to see the patient.

The foregoing is based upon the normal progress of a patient during the first twenty-four hours succeeding an operation and the duty of the attending nurse during that period. It is not presumed that every operative patient experiences such smooth progress. Emergencies frequently arise and serious complications often present themselves so that more active attendance on the part of the nurse is demanded. They are of such vast importance that every nurse should be intimately aware of their nature and possibility as well as of their treatment. We shall devote another chapter to their discussion. Before doing so, we shall consider the patient's progress along the normal course during the succeeding days of convalescence.

## CHAPTER VIII

### POST-OPERATIVE CARE IN NORMAL CONVALESCENCE AFTER THE FIRST TWENTY-FOUR HOURS

The night following the operation may be one of almost ceaseless activity and anxious watching, or it may be a period of rest from which the patient awakes with the mind clear and with yesterday's experiences a hazy and indistinct memory. In normal cases the night will have been one of comparative rest provided morphin has been judiciously used, and the patient will be found with the temperature normal and a pulse of from 80 to 100.

The first duty that awaits the nurse on the morning of the first post-operative day is the toilet of the patient. The hands and face should be bathed, the mouth and teeth cleansed, and the pillows and bedclothes arranged. Unless contraindicated, some form of liquid nourishment must be prepared for the patient. This task accomplished, the nurse may permit the patient to remain in charge of an assistant while she goes to breakfast.

The day will be a busy one. The cleansing or sponge bath is first in order and an alcohol rub following it will be beneficial to the patient. The bath and rub completed, the abdominal binder, if a laparotomy, should be readjusted. This affords an opportunity for the nurse to ascertain whether the dressings are maintained in place and remain unsoiled. The bed should then receive attention and clean linen replace that which is soiled. After the room is put in order the morning's general care will be finished.

The nurse should now direct her attention to making the morning entries on her chart and then await the surgeon's visit. Normal progress occurring, the surgeon probably will leave orders somewhat similar to the following:

Water freely; liquid nourishment, q. 2 or 3 h.

Strychnin, gr.  $\frac{1}{40}$ , by mouth, q. 4 h.

If flatus of an annoying degree occurs insert rectal tube or give a low enema.

Morphin, gr.  $\frac{1}{6}$ , or codein, gr. 1, p. r. n. for restlessness or pain.

T. P. R., q. 2 h.

Besides carrying out these orders the nurse's duty will consist in ministering to her patient in such manner as will secure the greatest amount of comfort and rest.

After the noon nap the patient will experience "muscle ache," languor from the normal surgical rise of temperature of one to two degrees, and, possibly, distention from an accumulation of intestinal flatus or from operative trauma.

In order to secure a comfortable position the patient will move about, thereby producing sharp twinges of pain in the wound. This pain may cause fretfulness and restlessness, which may be prevented or lessened by one or more of the following expedients with which the efficient nurse should be familiar:

Changing the pillows.

Placing a pillow under the knees.

Gently turning the patient on her side and supporting her in that position with pillows at her back, and at the same time placing a pillow between her knees.

Alcohol rubs.

Bathing hands and face.

Cold compresses on the forehead.

Suitable and appealing liquid nourishment.

Brief periods of diverting conversation.

Frequent airing of the sick chamber.

The nourishment found most suitable and acceptable in liquid form consists of:

Albumin water flavored with orange or lemon juice.

Beef extract or strained broths.

Milk with limewater.

Tea, cocoa, or grape juice diluted with plain water or carbonated water.

While liquid nourishment may be ordered every two hours, it would not be a wise policy to insist on its ingestion. Water is to be given freely. Care must be exercised to prevent vomiting by overloading the stomach which may still be somewhat irritable from the after-effects of the anesthetic. One need not worry because the patient expresses an antipathy

to nourishment during the second day. The chief concern should be to induce the consumption of fairly large quantities of water.

Even after the nurse has done everything that can be done, four o'clock may find the patient fretting and complaining. In this event one grain of codein is indicated. A tranquil state will follow and the patient will soon fall asleep. Awakening, she will be remarkably refreshed and quieted.

At seven o'clock the nurse should commence preparing the patient for the night. This preparation includes an alcohol rub, bathing the hands and face, and cleansing the mouth. The bedclothes and pillows are to be neatly arranged for the patient's comfort and to induce sleep. These preparations completed, the windows should be raised to secure proper ventilation, the lights lowered, and quiet throughout the house insisted upon.

Normally, the patient should soon fall into a quiet slumber. If, after an hour or two, the nurse finds her still awake and signs of renewed restlessness appearing, another grain of codein may be administered. Following this there should occur five to seven hours of slumber, interrupted only by a request for a drink, a change of posture, or the rearrangement of pillows. The morning of the third day will find the normal patient refreshed and with signs of early convalescence apparent.

#### FLATUS

Flatus is occasioned chiefly by the entrance of air into the abdominal cavity through the operative wound, by prolonged exposure and handling of the intestines during the operation, by the operative work upon the intestines themselves, drastic preoperative catharsis, and the use of too much morphin which arrests peristalsis with consequent failure to empty completely the gastrointestinal tract.

Flatus first evidences itself from twelve to twenty-four hours after the operation. It is characterized by abdominal distention and colicky pain (gripes), both of which increase pain in the wound by reason of the wound tension. The patient complains of feeling "full," and that the binder is tight.

The condition is very annoying, and the frequent griping attacks oc-

casion marked discomfort and restlessness. It is difficult to describe the discomforts resulting from flatus. One must personally experience its distress before becoming fully appreciative of the importance of instituting measures calculated to afford relief.

When these gas pains occur, the nurse, unless receiving distinct orders to the contrary or the nature of the operation itself contraindicates, should institute the following procedures:

The insertion of a rectal tube for a distance of four to six inches. If this is effective it may be repeated as frequently as required.

A low salt and glycerin enema. The flatus will often be expelled in fifteen to thirty minutes after the expulsion of the enema.

The injection into the rectum, under low pressure, of six to eight ounces of milk of asafetida. Repeat as indicated.

A low oil and turpentine enema.

Frequent change of position.

Carminative drinks, such as ginger or peppermint.

Milk of magnesia in one-dram doses or soda mint tablets by mouth.

The withholding of morphin, which should at all times be employed as sparingly as possible.

These measures properly employed will, as a rule, bring relief. If not, the condition becomes one of great concern and falls into the class of post-operative emergencies.

### CATHARTICS

It is desirable to secure a movement of the bowels usually by the third day. The method employed to produce it will vary naturally with every operation. In other than abdominal work, a course of calomel followed by magnesium sulphate, citrate of magnesia, castor oil, or cathartic pills may be employed, according to the surgeon's custom. In abdominal cases the result desired is generally induced by means of enemata administered on the morning of the third day. The enemata consist commonly of ordinary soapsuds, oil, salt, and glycerin, or at times of the old enema, oil, soapsuds, turpentine, and water. The enemata should be repeated for one or two days, after which they are discontinued. If a cathartic is still required, it is customary to order pulvis glycyrrhizæ compositus (compound licorice powder), cascara, citrate of magnesia, a cathartic pill, or a saline laxative as frequently as necessary to secure one or two free bowel movements daily.



## CATHETERIZATION

How soon after an operation should a patient be urged to void urine, and when failing to do so when should she be catheterized? We must remember that just previous to being placed on the operating table the patient was catheterized and the bladder entirely emptied, that the first post-operative hours were devoid of the ingestion of water, and that the patient undoubtedly perspired more or less freely. Consequently, the kidney secretion will be diminished during the first twenty-four hours.

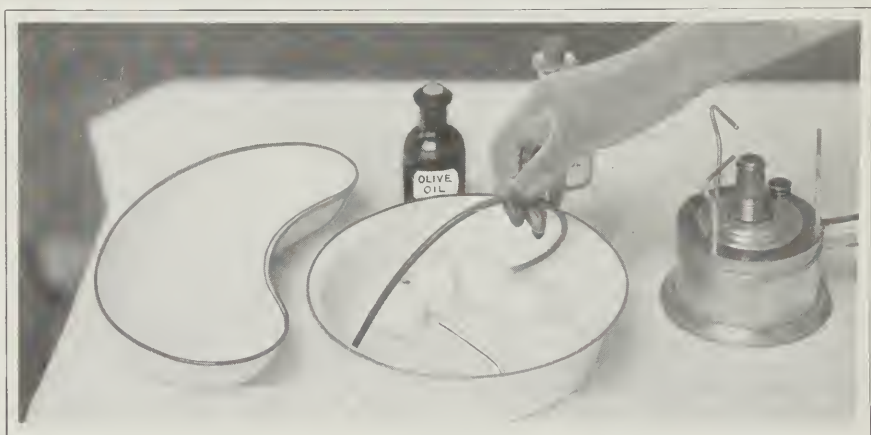


FIG. 78.—TRAY FOR CATHETERIZATION.

Catheters, cotton balls, and olive oil sterilized. The nurse with sterile gloved hand removing catheter from basin in which it was boiled.

As a rule, if no discomfort is expressed, eight to ten hours may be permitted to elapse before suggesting to the patient the desirability of urination. If unable to void urine voluntarily and there is no complaint of distress the patient may be permitted to go one or two hours longer before the second attempt is urged. If the patient is still unable to urinate, the application of hot towels to the vulva or the pouring of warm water over the vulva will frequently induce voluntary urination. If unsuccessful, it then becomes necessary to catheterize. The only exception is in patients who have undergone hysterectomy, plastic repair of the vault of the vagina, or work upon the bladder. In these cases distention of the bladder must be prevented either by voluntary evacuation of urine or by catheterization every six or eight hours.

Some patients cannot pass urine voluntarily while lying in bed. Here catheterization will have to be done every eight or ten hours.

Every precaution should be observed to make catheterization a sterile procedure (Fig. 78). *It must always be performed under direct inspection.* When repeated catheterization becomes necessary, some surgeons will direct that a dram or two of a 5 or 10 per cent. solution of argyrol be injected into the bladder just preceding the withdrawal of the catheter and permitted to remain. Others may order urotropin in powder or in liquid suspension to be given by mouth three or four times a day as a urinary antiseptic. This precaution is observed to prevent so far as possible occurrence of cystitis, which is a frequent consequence of repeated catheterization.



FIG. 79.—PREPARING FOR AN ABDOMINAL DRESSING.

Bedclothes and nightgown turned back and covered with sterile towels. Scultetus binder *in situ*.

#### DRESSINGS

When the general condition of the patient indicates a normal convalescence—normal temperature and absence of complaint that might indicate

infection or wound disturbance—it is rarely necessary to inspect or dress the wound until after the lapse of a week or ten days. The only attention directed to the dressings is to ascertain that they are in place and to readjust the external binder.

At the end of a week or ten days the surgeon will inspect the wound and



FIG. 80.—THE NURSE UNTYING ABDOMINAL TAPES.

Scultetus bandage removed, entire field draped with sterile towels, required supplies at hand: bottles of alcohol and iodine, basin for alcohol, sterile gauze, paper bag for soiled sponges and dressings removed, and sterile instruments (from right to left, grooved director, two pairs scissors, two artery snappers, suture forceps).

remove whatever tension sutures may have been inserted. This process is one that should be characterized by a sterile technique.

For dressing the wound the following will be required:

Sterile towels.  
Pair of gloves.  
Scissors.  
Tissue forceps.

Probe.  
Sterile dressing gauze.  
Alcohol.  
Adhesive plaster.

While the surgeon is washing his hands the nurse should direct her attention to arranging the patient and draping the field. The nightdress should be folded up on the chest and the bedclothes turned down to the

pubes and covered with sterile towels well tucked under above and below the wound (Fig. 79). Instruct the patient to keep her hands above her head so as not to interfere with the drapings. It is always well to assure the patient that she need not be alarmed, as the procedure will be attended by very little if any discomfort.

The field is then draped with other sterile towels. The instruments,

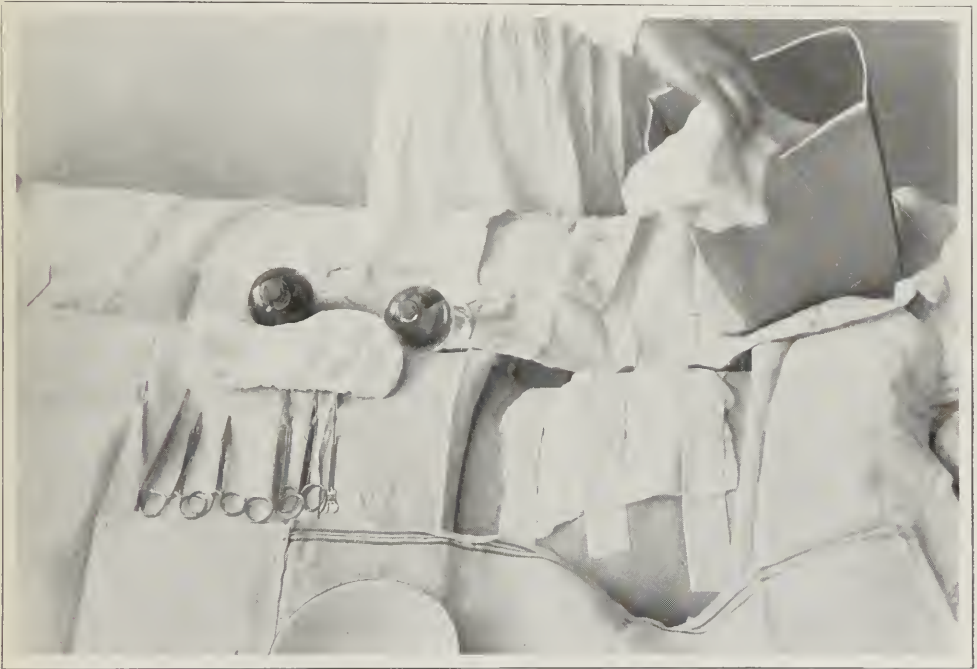


FIG. 81—PLACING ABDOMINAL PAD IN A PAPER BAG.

Nurse has untied the adhesive tapes and is placing the abdominal pad in the paper bag. Other dressings covering wound *in situ* and maintained with adhesive strips that were applied at the completion of the operation.

which have been sterilized, are placed on one of the sterile towels, as are also the opened packages of gauze (Fig. 80). The external binder is opened, the adhesive tape strings untied, and the abdominal pad and superficial dressings lifted from place (Fig. 81). The surgeon or nurse will remove the dressings which are in direct contact with the wound (Fig. 82).

After the stitches are removed (Fig. 83), the wound may be bathed with a moist alcohol sponge, after which it is again covered with sterile



gauze held in place with one or two strips of adhesive plaster. The adjustment of the abdominal pad and binder completes the procedure.

Wounds in which drainage is employed or which have become infected and require daily dressing must, of course, be frequently exposed, and when so exposed they should be draped in the manner described. The methods employed in these instances will be described in another chapter,

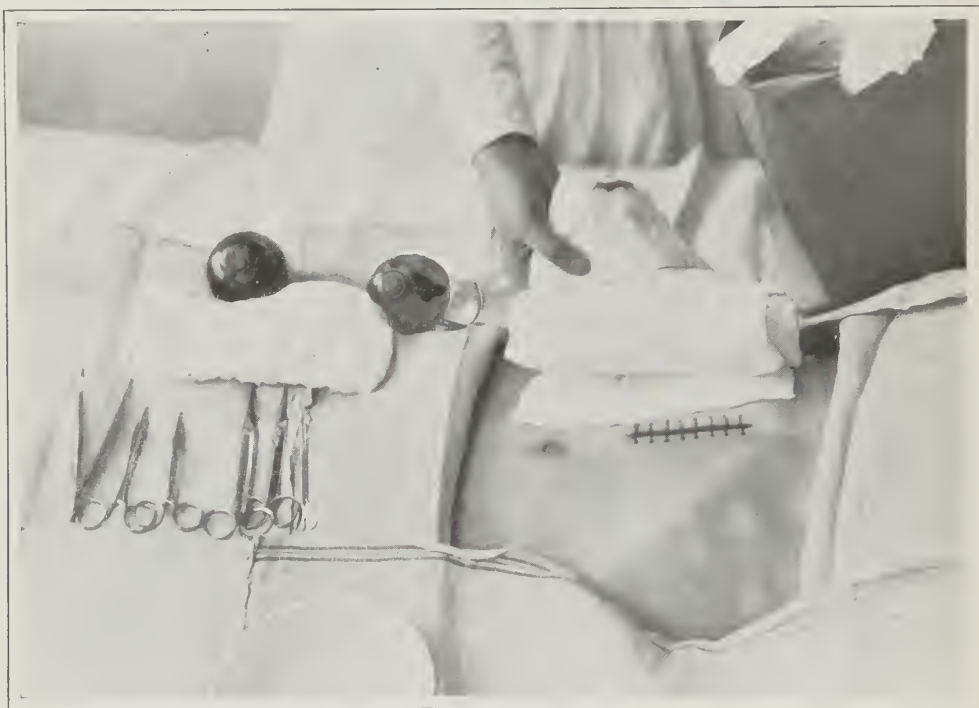


FIG. 82.—REMOVING THE LAST DRESSINGS.

Abdominal pad has been put in the paper bag supplied to receive soiled dressings. Nurse has loosened the adhesive straps holding these dressings in place without contaminating the field. With removal of these last dressings the field is ready for the surgeon to remove the sutures.

“The Process of Healing and Care of Wounds.” Every time a wound is inspected or treated a record should be made on the daily chart. The time that the stitches are removed should be noted, as well as the name of the person who assumed that responsibility.

As a rule, at the end of two weeks all dressings may be entirely removed from a wound that has healed by primary intention. Union will then have been firmly produced and further dressings will not be required. Band-

ages, abdominal supports, and similar contrivances are but seldom required. The corset may be worn as soon as the patient wishes.

#### GETTING UP

No definite time can be set as to when the patient may first sit up or get out of bed. This can be determined only by the surgeon after con-

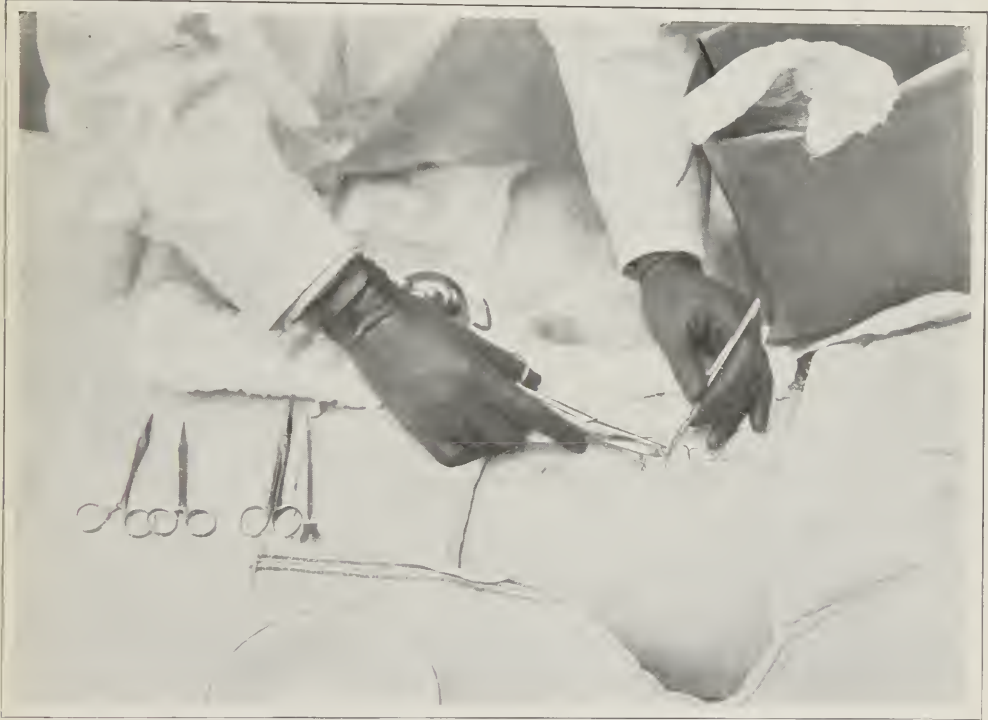


FIG. 83.—REMOVAL OF SUTURES BY SURGEON.

Surgeon wearing sterile gloves and holding suture cutting scissors and suture forceps. Note.—In order to photograph the removal of sutures it was necessary for the surgeon to stand in the nurse's place.

sidering the nature of the operation that has been performed, the course of convalescence, and the patient's general physical condition. The former practice of two to three weeks' rest in bed is now generally abandoned, and the tendency is to permit the patient to leave the bed early. This practice, it has been found, has a tendency to induce an early and speedy return to normal strength.

When the surgeon has given his permission to the patient to sit up, it



is incumbent upon the nurse to see that these orders are carried out with reason. To permit a patient to sit up with a back rest for the first time for a period of an hour or longer is unreasonable. Patients sitting up for the first time should not be granted the privilege longer than fifteen minutes. A return to the recumbent position should then be insisted upon. Gradually the time may be lengthened, but between the periods there should be a reasonable time for rest. The same precaution should be observed when the patient gets out of bed to sit in a chair. It will be well to inform the patient that there may be a feeling of dizziness, prickling of the limbs, or even a fainting spell when she first attempts to sit up. The patient will then not be alarmed should such an unpleasant experience occur. These occurrences may be prevented to a great extent if the patient be gradually placed in an upright position.

When the patient sits up there may be noted at times a rather marked increase in pulse-rate and even a slight rise in temperature. These conditions need occasion no alarm, as a return to normal will speedily follow. If a persistent, rapid, and small pulse is met with, the patient should be returned to bed and the periods of sitting up shortened until the acceleration of the pulse becomes less marked.

On the day following the first attempt to sit up the patient may complain of muscle stiffness or soreness. It is the result of yesterday's change in position, and the muscle work required in maintaining it. The soreness will disappear after a few days, when the muscles regain their former tone and strength. In some patients the discomfort does not disappear for several days or even weeks. General massage of the back and limbs will be found most useful in relieving these aches and muscle pains.

The succeeding days witness the patient's return to that stage of convalescence when the services of the nurse are no longer required. When leaving the case offer your chart to the surgeon for filing with his records. If he does not desire to keep it, it is advisable that it be destroyed before you leave the patient's home.

We feel certain that every nurse who faithfully and cheerfully performs the duties required by her patient will receive the good wishes of the

patient and family whom she loyally serves, and there will be expressions of regret over the severing of the relationship of patient and nurse. These are the nurse's reward over and above the monetary return received, and are the permanent records which characterize her in her community as a desired, dependable, and faithful nurse.

## CHAPTER IX

### POST-OPERATIVE EMERGENCIES

A surgical emergency is the alarm signal that calls forth the greatest reserve training and ability of the attending nurse. The efficiency with which the nurse meets the responsibility thus suddenly thrust upon her frequently determines the ultimate outcome of the operative procedure. The promptness with which the nurse detects the onset of an emergency and the efforts she institutes to forestall or combat its progress are dependent upon her knowledge of the nature, symptomatology, and treatment of post-operative emergent complications. No nurse should ever assume the entire charge of a surgical patient unless she possess this knowledge.

The operation over, the patient in bed, and the surgeons gone, the progress of the patient should and must always be the nurse's sole and primary concern. The lapse of one or several hours after the completion of any operation is the first period wherein certain emergencies may occur. The second period is the first two or three post-operative days. The third period is from the sixth to the tenth or the twelfth post-operative day. While emergencies are possible at any period, any hour, or any moment, experience has taught that certain definite forms of complications occur in three designated portions of the convalescent period. Tabulated, these emergencies are:

#### FIRST PERIOD

1. Respiratory collapse.
2. Circulatory collapse.
3. Shock.
4. Hemorrhage.

#### SECOND PERIOD

1. Cardiac exhaustion.
2. Delayed hemorrhage.
3. Intestinal obstruction.
4. Ileus.
5. Acute gastric dilatation.
6. Acute anuria: uremia.
7. Peritonitis.
8. Pneumonia.

9. Exhaustion.
10. Toxic singultus (hiccup).
11. Hyperpyrexia.
12. Persistent vomiting.

#### THIRD PERIOD

1. Sepsis, or septicemia.
2. Pneumonia.
3. Phlebitis.
4. Anuria: uremia.
5. Obstruction.
6. Cardiac exhaustion.
7. Secondary hemorrhage.
8. Peritonitis.

The patient may apparently be in good condition, when suddenly a change is noticed. Her expression, pulse, respiration, and actions show that progress is no longer satisfactory, and that an emergency presents itself which demands prompt and possibly heroic procedure. The family and friends are prone to recognize the critical conditions, and, in their overanxiety, frequently add to the complexity of the situation by their thoughtless and hysterical attempts to render aid.

The nurse who meets such an emergency in a calm, master-of-the-situation manner, and institutes a definite plan of action until the doctor or surgeon arrives, is entitled to our sincerest respect and admiration. Upon her judgment and discretion much depends.

To enable the nurse to acquit herself in a commendable manner, as well as to render the most efficient aid to her patient, it will be my purpose to outline the salient diagnostic points of the more common emergencies and the treatment that is within the province of the nurse to administer. Such activities call for immediate communication with the surgeon or attending physician, and the institution of the recognized treatment.

In sending for the surgeon or physician, so explain the nature of the emergency that your messenger will be able to repeat it to the surgeon when he is reached by telephone or personal summons. By sending such an informative call, the doctor will be able to bring with him, without loss of time, such remedies and supplies as are necessary for treatment. Nothing is so exasperating as to receive a call in a high-strung, hysterical voice: "Come at once, Doctor. Mrs. — is dying." Though the doctor thus summoned takes with him certain supplies, his arrival at the bedside usually finds him without the articles which he requires but which he could readily have brought with him had he received an intelligent report. Valuable time is thus consumed and the patient's danger increased by the delay.

#### SHOCK AND HEMORRHAGE

Shock is defined as a lowering of the vital powers whereby there is produced a complete or transitory cardiac embarrassment with spasm of the extreme vessels and a depression of nerve function. It may be of any

grade of severity from a transitory derangement of circulatory function to profound collapse and speedy death. The exact pathology of shock is at present unknown, as post-mortem examinations do not reveal the etiological factors. Much study and discussion have resulted, and numerous, as well as varied, opinions are held by different members of the profession, but gradually, as more accurate information comes into our possession, many of the former conclusions are discarded because they are no longer tenable.

It is generally conceded that shock attends or results from the loss of large amounts of blood, rough or unskilled handling, exposure of vital tissues or organs, prolonged operative work, or the oversaturation with the anesthetic. It is my experience and opinion that the phenomena of shock result chiefly from the loss of large amounts of blood; in other words, that shock is but an after-result of operative hemorrhage and that when the loss of blood during operation is minimized, shock does not result. The phenomena of shock may be interpreted as the result of hemorrhage or the loss of a devitalizing quantity of blood. This is the most frequent cause, and it will be noted that the degree of shock is in direct ratio to the amount of blood lost during or after the operation. I do not recall the presence of shock in or after any operative procedure where a conservative hemostasis had been accomplished.

Shock has evidenced itself in ectopic pregnancy with hemorrhage into the free abdominal cavity, in operations upon the brain where inadvertently large amounts of blood had escaped from the scalp and dural vessels, in placenta prævia, and in nephrectomy when the kidney vessels had slipped from the hemostats and a great deal of blood lost before they were again secured. In consultation, I have seen shock in cases where delayed or secondary hemorrhage had occurred from the slipping of ligatures from the pedicles containing large vessels. In view of this experience, I have become accustomed to look for the source of shock in the amount of hemorrhage that has occurred or is occurring. If shock symptoms do not appear until twelve or twenty-four hours after the patient has returned to bed, the conclusion may be made that delayed hemorrhage is taking place and its source must be detected and arrested.

**Symptoms.**—The symptoms that denote the presence of shock and enable us to recognize the condition are:

A pulse of 120 to 160, small, running, and of small caliber.

Pale, clammy, cold skin, hands, and feet.

Increased and shallow respirations.

A temperature of 98.6° or as low as 97°.

Mental alertness, excitability, or delirium.

Semiconsciousness or complete unconsciousness.

Restlessness.

If a gradual loss of blood is occurring, the patient will express her feelings thus: "I feel so queer," "My head feels light," "The room is dark," "My ears ring," or similar expressions denoting the presence of cerebral anemia.

The mucous membranes, lips, ears, and finger nails will indicate the absence of blood and lose their normal color.

Vomiting may occur.

These symptoms will exist in varying degree, depending upon the severity and gravity of the condition. The diagnosis is based upon the rate and character of the pulse, the temperature, and the patient's general appearance.

While we may encounter a post-operative condition in which there is a rapid pulse that ranges from 120 to 160 for from one to several hours, and during which the patient is listless or only semiconscious, with a pale skin, the condition cannot rightly be termed shock. It is a condition of cardiac fatigue or depression arising from the prolonged exposure or handling of vital organs or tissues and deranged enervation. The complex symptoms of shock are absent.

The condition referred to in the preceding paragraph is more properly the result of nerve trauma and is understandable when we are familiar with Crile's theory of anoci-association. The condition does not ensue when Crile's methods of prevention are employed. It is a preventable complication.

**Prevention.**—Preventive measures include careful hemostasis and careful ligation of possible bleeding points, expeditious operating, and a minimum of trauma.



**Treatment.**—The treatment of shock consists of the following measures:

Control of bleeding vessels by packing, artery forceps, or by reopening the wound and religating the vessels.

Replacing the loss of blood with salines (intravenous, subcutaneous, or rectal) and transfusion of blood.

Morphin, grain  $\frac{1}{6}$  to  $\frac{1}{4}$  by hypodermic. Careful stimulation with camphor oil or whiskey. Strychnin is of little avail, as are the other common heart stimulants. Strychnin is, however, a valuable adjuvant to patients suffering from nerve trauma and depression.

Local heat.

Elevation of the foot of the bed if not contraindicated by reason of abdominal drainage.

Abundance of fresh air.

Quiet surroundings.

Reconstructing blood remedies and nourishing food.

What procedure should a nurse pursue when she finds her patient with symptoms of shock, and medical assistance is not immediately available? The following are all within her province and their employment will be her most effective treatment until the surgeon or the physician arrives.

1. Send for the surgeon.

2. If an active, open, visible hemorrhage presents itself, control it by packing the wound with sterile gauze, or, if the bleeding vessel is visible, clamp it with a forceps. Even if sterile gauze is not available, the use of as clean gauze or linen as is securable is justified. The possibility of infection is of minor concern in the presence of this greater emergency. If the hemorrhage occurs from the uterus or vagina, pack the uterine cavity and vagina with gauze or cotton, apply a vulvar pad, and a firm T-bandage.

3. Give  $\frac{1}{6}$  to  $\frac{1}{4}$  grain of morphin, depending on the patient's age.

4. Elevate the foot of the bed if not contraindicated.

5. Apply local heat in the form of hot-water bottles to the extremities and around the trunk.

6. Commence a drop saline by rectum or give a rectal enema of one pint of normal saline. The nurse may give, if capable of doing so and the doctor's arrival is likely to be much delayed, 600 to 900 cubic centimeters of normal saline subcutaneously, preferably under the breasts, before beginning the "rectal drop."

7. Give an ampule of camphor oil every hour for three or four doses, or a hypodermic of whiskey, 60 minims, every fifteen minutes for four doses,

then every half hour. The administration of circulatory stimulation is to be governed in amount and frequency by the character and quality of the pulse. Be careful of overstimulation.

8. Abundance of fresh air.

9. By actions and expression restrain the patient's excitability and prevent the relatives from creating hysterical scenes in the sickroom. Make such preparation as your judgment leads you to believe will be required by the doctor.

10. When the doctor arrives, tell him briefly what has occurred and the measures you have instituted. A nurse who understandingly employs the methods suggested is justifying the responsibility that has been placed upon her and will receive the hearty commendations of an appreciative surgeon.

When the condition is one of cardiac fatigue or of nerve-center irritation, the nurse should be guided by the same order of procedure. In addition, strychnin, grain  $\frac{1}{60}$  to  $\frac{1}{30}$ , depending on the patient's age, administered every three hours, is indicated. The differential diagnosis from active hemorrhage is made by the absence of pallor of the membranes, ringing in the ears, light-headedness, complaint of the darkness of the room, sighing, rapid, shallow respirations, and absence of bleeding vessels. Remember that in the majority of instances shock and hemorrhage are synonymous.

#### RESPIRATORY FAILURE OR COLLAPSE

This condition arises during operative work or in the period of recovery from the anesthetic. It is caused by:

The anesthetic.

An embolus affecting the nerve centers of the brain or lodging in a pulmonary vessel.

Injury to the pneumogastric nerves.

Trauma to, or prolonged exposure of, the diaphragm.

Spasm of the glottis.

Obstruction of the air passage by swallowing the tongue or inspiration

into the air passages of mucus, blood clots, sponges, or artificial teeth; the dropping of the jaw.

Lung collapse from perforation of the pleura.

Intrathoracic hemorrhage, possible in radical breast amputations.

**Symptoms.**—The symptoms of respiratory collapse are:

Sudden or gradual cessation of respiration.

Strangling, struggling for air.

Livid skin and membranes.

Increased and very rapid respirations of superficial character.

The heart may continue to beat for some time after the respirations have ceased.

**Treatment.**—The following measures may be employed in treating this emergency:

1. Remove or combat the cause.
2. Amyl nitrite and oxygen inhalations.
3. Artificial respiration.
4. Tracheotomy, if indicated.
5. Respiratory stimulation by camphor and strychnin.
6. Judicious heart stimulation.

#### CARDIAC COLLAPSE

This condition may occur during the operation or at any time until complete convalescence is established. It may be caused by:

Emboli reaching the heart—air, clot, fat, or loosened thrombic fragments.

Prolonged strains, nerve irritation, or sudden exertion.

The anesthetic.

Valvular or myocardial disease.

Infections producing myocarditis or endocarditis.

**Symptoms.**—The symptoms of cardiac failure are:

Collapse with a sudden cessation of heart action or with a rapidly rising, frequent pulse that soon becomes imperceptible.

Unconsciousness.

A mottled, mild lividity or extreme pallor.

Respiration continues frequently for several minutes after complete cardiac collapse has occurred.

**Treatment.**—For relieving this condition, the nurse should make use of the following treatment:

1. Recumbent position.
2. Removing or combating the cause.
3. Camphor oil, whiskey, nitroglycerin, or cardiac stimulation.

This complication often occurs so suddenly and the termination is apt to be so rapidly fatal that there is little or but brief opportunity for the treatment of the emergency.

#### CARDIAC EXHAUSTION OF THE SECOND PERIOD

As a rule, the pulse should fall below 100 within forty-eight to seventy-two hours. The existence of some untoward condition, such as an infection, absorption pneumonia, or a continued temperature of 100° or higher, entailing an increased heart action with a pulse ranging from 110 to 130, may result in cardiac failure.

Septic infection may be followed by an infective myocarditis, endocarditis, or pericarditis, with eventual cardiac failure as a possibility.

Dislodged fragments of, or the entire, thrombus may reach the heart and produce an immediate cardiac collapse. I have witnessed such a fatality three weeks after a simple cholecystectomy.

The exhausting taxation placed upon the heart when convalescence is complicated with pneumonia, acute gastric dilatation, ileus, obstruction, or similar conditions, may create a cardiac collapse.

The condition of the heart and its functioning call for constant watchfulness until convalescence is fully established.

**Symptoms.**—The presence of cardiac involvement may not be detected until the patient is in a state of marked collapse. In the event of such a sudden onset, our efforts toward revival are frequently futile, as death rapidly ensues. However, cardiac stimulants in physiologic doses are indicated.

When the cardiac exhaustion is of gradual onset, there will be noted a slowly increasing pulse-rate with a decreased volume of the pulse and altered rhythm. The pulse increases from 100 to 120, 130, 140, or 160

and finally becomes uncountable. This process may gradually become apparent as the heart weakens under its embarrassment.

**Treatment.**—The treatment consists primarily of prophylactic measures to conserve the heart's tone and function. The patient should never be subjected to sudden strains or movements. When fear of heart exhaustion exists, the patient's strength is to be safeguarded. The recumbent position is to be insisted upon. Strychnin, digitalis, strophanthus, nitroglycerin, or similar cardiac supports are to be guardedly administered.

Equalization of the circulation is to be sought by the employment of baths, rubs, and massage. A bland, nourishing diet is indicated. The judicious employment of an ice bag over the precordial region will be found of value. The removal of the cause, in so far as it is possible, is of primal importance. At best, the condition is one of grave portent and evokes a most solicitous concern and faithful nursing.

#### DELAYED HEMORRHAGE

Delayed hemorrhage may result from premature absorption of a ligature before the severed end of a blood vessel has been firmly sealed; it may result from necrosis and sloughing of the wall of large vessels; it is possible in extensive wound infections or from sudden and severe strains upon the wound. The condition is detected by the symptoms of shock which indicate the presence of occult blood and by the other symptoms of hemorrhage. The treatment is identical to that of primary hemorrhage. Delayed hemorrhage may occur from the fourth to the fourteenth day.

#### INTESTINAL OBSTRUCTION

Intestinal obstruction may attend any celiotomy. It occurs by reason of adhesions, paralysis of the bowels from rough handling or exposure, impaction, intussusception, a loop of the intestine becoming imprisoned in the wound or around the round ligaments when they are employed to suspend the uterus and the technique of prevention is not observed, and from a narrowing of intestinal lumen.

**Symptoms.**—In intestinal obstruction the following symptoms will be noted:

Failure to secure satisfactory bowel movements and passage of flatus.

Nausea and vomiting, the latter becoming fecal.

Abdominal distention.

Increasing heart action and eventual death if the condition is not promptly relieved.

**Treatment.**—The treatment consists of the employment of enemas of oil, salts, and glycerin, milk of asafetida, and milk and molasses. Eserin, pituitrin, atropin, and strychnin are indicated hypodermatically.

Nothing is to be given by the mouth except small quantities of water.

The cause must be sought and removed at the onset of the first signs of the obstruction. If needs be, the abdomen must be reopened and the release of the bowel secured. While this may require courage, nevertheless no reason exists for delaying. To successfully relieve the condition one must allow a reasonable length of time to secure results from simple measures. Energetic and vigorous methods should be instituted, but if, after a reasonable elapse of time, the condition is not controlled, the abdomen should be reopened and the obstruction relieved.

#### ILEUS

Ileus is a condition in which there is dilatation of a portion or all of the small intestine, distention, obstruction, and toxic absorption. With this condition there is a cardiac and a respiratory embarrassment with more or less vomiting. Ileus may ensue after exposure, handling, or operative work upon the intestines. If strychnin, enemata, gastric lavage, pituitrin, and fomentations fail to produce early and prompt relief, operative measures are to be employed and an enterostomy performed.

#### ACUTE GASTRIC DILATATION

**Symptoms.**—This serious complication may develop at any time but is most frequently encountered during the first three days.

The condition is due to gastric distention and dilatation by reason of displacement or kinking and obstruction of the pylorus. The principal symptoms are pain and failing pulse.

Persistent epigastric pain is the first complaint with more or less epigastric distention.

Without other cause the heart action becomes rapid and weak.



Nausea and retching are present.

Death results if the condition is unrelieved.

Gastric dilatation must not be confused with intestinal obstruction by reason of the stomach manifestations.

**Treatment.**—The treatment consists mainly of frequent and copious gastric lavage with normal saline.

The patient's position is to be frequently changed by employing Fowler's position, elevation of the head of the bed, or even the prone position (on the stomach).

All nourishment is to be withheld until relief is accomplished.

#### ACUTE ANURIA: UREMIA

This condition is a grave complication, evidenced by diminished or complete lack of kidney secretion and the onset of uremic symptoms. Its prevention is more readily accomplished than is successful treatment after it exists.

**Preventive Treatment.**—The prophylactic treatment consists of knowing the functioning capacity of the kidneys before operation, and by post-operative proctoclysis. The consumption of an abundance of water is likewise to be encouraged.

**Treatment.**—The active treatment calls for free catharsis, hot packs, subcutaneous and rectal salines, and diuretic and circulatory stimulants.

Decapsulation of the kidneys may be of material aid.

If unrelieved in reasonable time, uremic symptoms ensue and eventually death closes the scene.

#### PERITONITIS

Peritonitis is due to infection and inflammation of the peritoneum. When following abdominal section, it is attended with a high mortality and is really the *bête noire* of the abdominal surgeon. It may occur at any time after the first twenty-four hours—most often from the second to the fifth day.

**Symptoms.**—Fever or subnormal temperature.

Persistent vomiting.

Gradually increasing, rapid but small pulse.

Constant abdominal pain.

Tenderness.

Distention and signs of exhaustion.

**Treatment.**—The treatment must be prompt and vigorous and consists of draining the abdominal cavity, saline cathartics to produce frequent, watery stools, supportive measures, and local fomentations. Our only hope is to produce elimination, secure drainage, and foster the patient's strength in the hope that Nature will overcome or limit the infection.

#### POST-OPERATIVE PNEUMONIA

Surgical pneumonia is like other pneumonias in its symptomatology, course, and treatment. It is a grave surgical complication that is rapidly fatal in a large majority of cases. Recovery, however, should not be despaired of; intelligent treatment toward its relief should be given.

#### EXHAUSTION AND TOXIC SINGULTUS

As these terms imply, they comprise possible post-operative emergencies and complications. The standard treatment for their relief is to be carried out in careful and thorough detail and consists principally of elimination and forced nourishment.

#### PERSISTENT VOMITING

To relieve persistent vomiting frequently tries our every ingenuity. It may occur in one patient and not in another even though our preoperative preparation has been as painstaking for the one as the other. What affords relief in one patient may be entirely without result in another. Again, the vomiting may cease spontaneously.

It is commonly ascribed to the anesthetic and the swallowing of anesthetic-laden mucus. Intra-abdominal and gastrointestinal surgery are possible etiological factors. The routine examination of the gall-bladder and the expulsion of its entire contents into the duodenum by finger pressure may cause the expelled bile to flow in such quantity into the stomach as to produce nausea and vomiting. The injudicious use of morphin is a productive factor. These and other well-known conditions induce this unpleasant and distressing state.

Of course one must rule out gastric dilatation, obstruction, commencing peritonitis, and ileus.

**Treatment.**—The treatment is varied. Most effectual is gastric lavage. Drugs are of little avail. Early after its onset if the patient takes one or two glasses of hot or cold water, the stomach contents will be expelled, thus causing an autolavage. If the stomach is now permitted to rest for a few hours by withholding everything, the vomiting will frequently be relieved.

Bits of cracked ice, carbonated waters, carminative drinks, bismuth in doses of twenty to thirty grains, soda mints, bicarbonate of soda, ginger ale, champagne, dry toast, crackers, lemon juice, castor oil, enemata, and morphin are all recommended and at times productive of relief.

However, experience teaches that the less meddlesome we are, the more speedily does the condition pass away. A commendable course to pursue is as follows:

One or two glasses of water, autolavage.

Rest of the stomach for from three to eight hours.

If not contraindicated, give a dose of morphin to secure sleep and rest when the vomiting is unrelieved and persistent.

Withhold everything for twelve hours.

If vomiting persists for twenty-four hours, give gastric lavage.

Enemata.

Polypharmacy and pernicious meddling should not be resorted to. Autolavage and the withholding of everything for from twelve to twenty-four hours comprise our chief procedure.

#### PHLEBITIS

Phlebitis is common during the second or third week. The condition is considered as being a septic one that causes an inflammation of the vein and formation of a thrombus which entirely or partially occludes its lumen.

**Symptoms.**—Phlebitis is ushered in by pain in the leg and groin and a chill followed by a rise in temperature to  $102^{\circ}$  or  $104^{\circ}$ . Pain varies in intensity.

There is tenderness over the course of the femoral vein and especially at Poupart's ligament.

The leg may swell but little or it may swell until the skin is shining from tenseness.

Suppuration may ensue.

**Treatment.**—The treatment consists of enveloping the limb with cotton and a bandage. Elevate and surround it with a moderate degree of local heat (Fig. 87).



FIG. 84.—PHLEBITIS. ENTIRE LIMB ENVELOPED IN HEAVY LAYER OF COTTON.



FIG. 85.—PHLEBITIS. COTTON MAINTAINED AND LEG SNUGLY BANDAGED WITH ROLLER GAUZE BANDAGE.

Painting the course of the vein with iodin is at times ordered.

*Massage of the limb must never be employed*, as there is grave danger of setting loose into the blood stream fragments of the thrombus that may become arrested in the brain, lungs, or heart and cause sudden death.

Eventually the condition will subside but convalescence is delayed two or three weeks.



FIG. 86.—PHLEBITIS. EXTREME ELEVATION OF LEG.



FIG. 87.—PHLEBITIS. LEG ELEVATED AND SURROUNDED WITH HOT-WATER BOTTLES.

The limb may never regain its normal contour, and edema may persist, with lessened functional capacity of the limb.



TABULATION OF COMMON POST-OPERATIVE COMPLICATIONS

CONDI- TION	CAUSE	SYMPTOMS	ONSET	TREATMENT
Shock	Hemorrhage Nerve depression Cardiac exhaustion	Rapid, small pulse Semiconsciousness Pale, cold, clammy skin Subnormal temperature	During operation 1st and 2d days	Remove cause, look for hemor- rhage, camphor oil, whiskey, morphin, salines, local heat
Hemorrhage	Defective ligation Unligated vessels Ulceration of vessel wall.	Shock, pale membranes Sighing respiration Small, rapid pulse Restlessness, cerebral anemia Bleeding	During operation First 48 hours 5th to 14th day	Arrest hemorrhage, morphin, salines, gentle stimulation, transfusion of blood, heat, lower head, hematinics
Vomiting	Anesthetic Obstruction Paresis Gastric dilatation	Nausea Retching Vomiting	Recovery from anesthetic First 24 hours	Autolavage, complete gastric rest, enemata
Anuria	Deficient kidney function Kidney disease	Diminished secretion Complete suppression Increased pulse, slowing as uremic symptoms present	24 to 72 hours 5th to 7th day	Prophylaxis, catharsis, diu- retics, hot packs, salines, decapsulation
Ileus	Intestinal paralysis from exposure and undue handling	As of obstruction Vomiting, distention, ris- ing pulse, prostration No bowel movement	24 to 72 hours	Enemata, gastric lavage, ca- tharsis, pituitrin, eserine, strychnin, enterostomy or enterocenterostomy
Acute gastric dilatation	Displacement Pyloric obstruction	Epigastric pain Epigastric distention, per- sistent vomiting, rising pulse	24 to 72 hours	Frequent gastric lavage, change of posture, strychnin, pituitrin, eserine, enemata, removal of cause
Obstruction	Adhesions Volvulus Incarceration Impaction Narrowed lumen	Distention, no bowel movement Vomit becoming fecal Rising pulse Pain Exhaustion	3d to 8th day	Enemata, pituitrin, eserine, strychnin, removal of ob- struction by prompt, early operative interference
Cardiac collapse	Anesthetic Prolonged strain Cardiac disease Infections Emboli Hyperpyrexia	Failing and rapid pulse Circulatory paralysis	Any time	Removal of cause, quiet, car- diac stimulants, circulatory equalization
Peritonitis	Bacterial infection and soiling of the peritoneum	Distention, obstruction, constipation, vomiting, pain, rising pulse 140- 160, subnormal tempera- ture, Hippocratic expres- sion, exhaustion, collapse	2d to 7th day	Drainage, continuous saline, copious bowel movements, posture, supportive treat- ment, stimulation
Emboli and phlebitis	Thrombic fragments: Fat, air, clot Septic	Cardiac Respiratory Collapse if heart or brain is reached Obstruction of vein	First 48 hours 7th to 14th day	If vital part is involved, treat- ment is valueless In vein—rest, elevation, band- age, heat, absolute quiet for two weeks, never massage

SEQUENCE OF COMPLICATIONS

FIRST DAY	SECOND DAY	THIRD DAY	FOURTH DAY	FIFTH DAY	SIXTH DAY	SEVENTH DAY	SECOND WEEK
Anesthetic Shock Hemorrhage Vomiting Vomiting Cardiac	Shock Hemorrhage Vomiting Acute gastric dilatation Ileus Peritonitis Anuria Cardiac Emboli	Hemorrhage Acute gastric dilatation Vomiting Ileus Obstruction Peritonitis Anuria Cardiac Pneumonia Emboli	Acute dila- tation Obstruction Peritonitis Anuria Pneumonia Cardiac Septicemia and wound infection	Ileus Obstruction Peritonitis Pneumonia Cardiac Secondary hemorrhage	Peritonitis Septicemia Wound in- fection Obstruction Cardiac Exhaustion Pneumonia	Cardiac Infection Pneumonia Obstruction Exhaustion Peritonitis	Phlebitis Emboli Anuria Septicemia Pneumonia Cardiac Peritonitis Hemorrhage Exhaustion

These tabulations should serve as a key that will enable the nurse to early detect the condition, cause, and symptoms of post-operative complications. From them she will also be enabled to direct the line of nursing treatment. On the whole, they are merely intended to put the nurse on her guard and familiarize her with what may happen, when it may happen, and the symptoms that usher in the complication.



## CHAPTER X

### THE PROCESS OF HEALING AND CARE OF WOUNDS

Wounds resulting from surgical interference are classified as incised wounds. They are premeditated and predetermined by the nature of the operative work that is to be performed. As such, they are repaired, after having been produced to form an avenue of approach to the surgical lesion, by similar structures being coapted and held in coaptation by suture material that is introduced in compliance with the surgical principles of repair.

The principle of coaptation is of but little concern to the nurse, as her province does not include participation in that procedure. She should, however, have a general knowledge of the various kinds of sutures and suture material. The nurse's relation to a surgical wound begins when the wound has been coapted by the surgeon. For this reason, she should be in possession of a general working knowledge of the process of repair, and the deviations from the normal course Nature institutes to accomplish healing.

Wounds are spoken of as healing by first, second, or third intention. This terminology is one of long standing and has been handed down to us by the early pioneers in the surgical world, who reasoned that Nature always sought or intended to accomplish the repair of all wounds, and that it was her primal intention to cause a prompt healing. Consequently, when this was brought about without delay or complication, the wound was spoken of as having healed by "first intention."

#### HEALING BY FIRST INTENTION

The process of repair of wounds by first intention is a physiological one, and the following is characteristic of its accomplishment.

When the severed tissues have been aseptically and carefully coapted and protected by a sterile dressing, a small amount of blood or serum flows

out between the cut edges, rapidly clots, and thus seals up the openings and spaces. Migrating blood corpuscles pass into this newly formed clot and into the tissues. Connective tissue and endothelial cells are now formed and produce new tissue. These cells are known as fibroblasts and they absorb the corpuscles that were first thrown out; by multiplying and interlacing they completely fill up the minute spaces that exist in the wound area. Capillaries then appear in this new connective tissue and the entire mass is now recognized as "being organized." The interlacing fibroblasts develop new fibers and when this process of development is complete the tissue formed is termed fibrous tissue. These fibers commence to contract and obliterate the capillaries by pressure. Epithelial cells are then developed and serve to close the skin edges. Cicatrization next occurs and consists of the formation of new fibrous tissue which finally contracts and so, by reason of its contraction, forms that white, tough tissue commonly spoken of as scar tissue. This process is usually accomplished with but little local disturbance and swelling, although occasionally there develops some swelling, redness, and circulatory stasis.

Summarized, the normal process of healing by first intention consists of:

Clotted blood.

Coagulated exudate.

Proliferating cells.

Fibrous tissue.

Contracted fibrous tissue.

Scar tissue.

Complete union.

#### HEALING BY SECOND INTENTION

The healing process may be retarded or entirely prevented by the presence or entrance of bacteria in such numbers as to render healing by first intention impossible. When such a complication is encountered, the healing of the wound then becomes dependent upon Nature's second method, that of healing by second intention or healing by granulation. This is accomplished in much the same manner as union by first intention.

The bacterial infection causes a peptonization of the intracellular substance, many reparative cells are carried off, and repair can only be effected by an enormous formation of fibroblasts. Soon after the closing of the wound the oozing ceases, because thrombi form in the vessels and clots gather in the tissue gaps and interstices. Exudation begins, and leucocytes

migrate into the exudate and the walls of the wound. In a short time the wound becomes distinctly glazed, or glistening, because of the formation of coagulation fibrin. The exudate is at first thin and red and soon becomes very profuse. In a few days the discharge becomes purulent. The connective tissue cells proliferate and form fibroblasts, which multiply to close the wound. From adjacent capillaries new capillaries form and run between the fibroblasts. When the discharge becomes purulent and leucocytes and fibroblasts are destroyed, inflammation increases, exudation becomes profuse, and new cells are rapidly formed to make up for the loss caused by microbic action.

Gradually the gap is filled. As it is being filled, the older fibroblasts in the deeper layers and edges of the wound are converted into cicatricial, fibrous, or scar tissue. As the granulations rise to a higher level at the surface, the area of fibrous tissue becomes broader at the base and margins, and in this young fibrous tissue contracts. The contraction draws the edges of the wound nearer together, and thus lessens the area of the surface which must be covered with epithelium. When the granulations reach the level of the cutaneous surface, the epithelial cells at the margin of the wound proliferate and the skin covering is formed.

If the granulations rise above the cutaneous level, healing will not take place, because the epithelium cannot then grow over the raw surface. A wound in this condition is said to possess exuberant granulations, or proud flesh. This formation must be destroyed and held in restriction until the raw surface is covered with epithelium.

The wound healed by second intention undergoes scar contraction the same as primarily healed wounds.

#### HEALING BY THIRD INTENTION

This consists of the union of two granulating surfaces, the granulations of one side fusing with those of the other. It is seen in the union of collapsed abscess walls. The granulations are formed as in healing by second intention.

#### SCARS

Healed wounds may present a narrow red surface which may, when the dressings are finally discarded, gradually broaden by reason of the

stretching that takes place in the new epithelium that forms the skin. This redness will gradually disappear, and a white area, varying from a mere line to a quarter of an inch or more in width, is the only remaining visible evidence of operative entrance. Patients will frequently worry over this broadening process but little occasion exists for uneasiness.

Most scars are insensitive, some are hypersensitive. The hypersensitive scars are usually thin and pale. The itching, burning, or tingling experienced in a sensitive scar is located, as a rule, at the junction of sound skin and the newly formed epidermis. The unpleasant sensations result from pressure upon the nerve filaments in the uninjured skin. The sensitiveness and itching of the scar may be relieved by frequent bathing with alcohol.

A scar may become inflamed, warts may spring from its cutaneous surface, keloids may arise from its fibrous tissue, carcinoma may come from the epithelial elements, sarcoma from the connective-tissue elements. These are all possibilities, but happily they do not appear in a large majority of the cases.

In abdominal incisions the peritoneum and skin may firmly unite, but on account of improper coaptation, infection, the too rapid absorption of suture material, strains, or an imperfect process of repair, the muscles and fasciæ do not unite or unite only in part. In this event, the pressure of the intestines will cause a stretching of the peritoneum, and one or more coils of intestine will protrude through the defective wall, thus forming a ventral hernia. When a ventral hernia occurs, it should be repaired at once by a herniotomy.

A ventral hernia is very apt to occur after drainage has been employed, for this, of course, makes it impossible to coapt the wound in its entirety. This should be borne in mind, and the patient warned of the possibility.



FIG. 88.—A SATISFACTORY APPENDECTOMY SCAR.

Shows scars of incision, of two tension sutures, and of catgut skin sutures. Two years after operation.

Frequently patients will resort to abdominal supports for many weeks. Such a precaution is no longer deemed necessary. If an abdominal wound has fully and firmly healed, a belt or support is seldom required; on the contrary, if a wound has not firmly united, a support will not correct the defect.

It is our custom to advise that the corset be worn just as soon as the wound is healed and the patient permitted to be up the major portion of the day. As there is no reason for not wearing it after the wound is healed, the patient may exercise her own judgment.

In the preparation of the preceding treatise on the healing of wounds, the author has condensed from "Repair of Wounds" in DaCosta's *Modern Surgery*, published by W. B. Saunders Company. The student desirous of possessing a greater knowledge of the process instituted by Nature to repair wounds is referred to the standard textbook on pathology and surgery.

#### THE CARE OF WOUNDS

What care should a surgical wound receive? It is our purpose to so discuss this phase of the subject that it may serve as a general guide to the nurse.

In our previous chapters we have briefly described some of these procedures in order that the subject under discussion might be more lucidly presented. In order that our present discussion may not be disconnected, it is necessary to repeat some of the information previously given.

The last suture tied, the wound, if a clean one and not drained, must be protected by an aseptic dressing that serves two purposes, protection and support; protection from outside contamination which would prevent uninterrupted healing, and support to remove strain or undue tension upon the suture material.

Not so very long ago it was common practice to first apply some one of the many so-called dusting or antiseptic powders. Experience has shown that the use of these powders is of little value in aiding repair or preventing infection. They are now but rarely employed.

The surrounding skin area is cleansed from blood stains with a sponge



moistened either with sterile water or alcohol. The wound and the surrounding skin are then thoroughly dried with sterile gauze, and the dressing, consisting of sterile gauze folded into convenient sizes, applied. If tension sutures have been employed, gauze is placed on either side of the wound to prevent the ends of the sutures from irritating the skin. Another gauze dressing is then placed over the center of the wound, and is followed by three or more dressings, thus forming a second layer over that previously applied. The whole is then maintained in place by adhesive straps fastened at the top and bottom of the dressings. These straps serve two purposes: they prevent the dressings from becoming dislodged and also prevent the patient from inserting her fingers under the dressing and thus contaminating the wound. Over this dressing is placed a filled pad which is held in place by adhesive tapes. A Scultetus bandage, applied rather snugly, completes the dressing.

In head dressings or in dressings of the extremities the same method is followed except that the filled pad may be discarded and cotton used instead, and a roller bandage displaces the binder.

In wounds which contain drainage and in those which require frequent change of dressings, the adhesive straps are not employed. In such drained wounds a large quantity of fluff gauze that readily absorbs the wound discharge will be found most suitable.

Some surgeons apply a silver foil directly to the wound before applying the gauze dressings; others seal the wound with collodion; another practice is to cover the wound with a double layer of gauze and seal its edges to the skin with collodion. Some clinics employ a large quantity of fluff gauze which is applied directly to the wound and maintained in place with a broad strap of adhesive plaster.

Draining wounds require frequent change of dressings, and this duty is often assigned to the nurse. These wounds are, as a rule, partly sutured. The purulent discharges will tend to cause infection and break down the sutured portion. This may often be prevented by cleansing the sutured area with 70 per cent. alcohol when changing the dressings and applying gauze moistened with the same strength of alcohol.

The drainage material commonly consists of rubber tubing, cigarette



drain, or gauze. When a rubber tube is employed it should be turned frequently to prevent pressure necrosis of the tissue it rests against. Such necrosis may cause ulceration into a large vessel, with severe hemorrhages.

Drainage material has very frequently become lost in the abdominal or thoracic cavity. To guard against this misfortune, drains should be anchored by a large safety pin inserted through the outer end if the surgeon has not anchored them with a suture. The drain should never be removed by the nurse without direct instructions from the surgeon.

Wounds that are drained heal by granulation. When the purulent discharge commences to lessen, the drainage tube is gradually removed by shortening its length every day or two. Finally, it is entirely withdrawn and gauze packing is used to lead off the discharge. This, in turn, is withdrawn so that eventually the wound becomes healed by fusion of the granulations. The attention is directed principally to keeping the wound clean and changing the dressings frequently so that the external surface does not remain bathed in the discharge.

Certain drugs or solutions are frequently employed to stimulate the growth of granulations. The two most generally used are balsam of Peru and solutions of nitrate of silver in strengths of 10 to 60 grains to an ounce of water. The caustic stick is also employed.

As the granulations approach the level of the skin, the wound may be drawn together by means of adhesive straps to favor and hasten the union of the skin.

In an aseptic operation in which the incision has been completely sutured without the use of drainage, the surgeon does not resort to frequent inspections to ascertain whether or not union is occurring by first intention. In such cases the temperature, pulse, and the patient's descriptions of the sensations experienced in the wound are the signs on which he bases his opinion as to whether an infection or satisfactory union is taking place.

Clean wounds, or those healing by first intention, are rarely disturbed until a week or ten days have elapsed. The suture may or may not be removed at the first inspection.

The patient's post-operative temperature should attain a normal register on or about the fourth day. If, on the morning of the fourth day, we

find the patient registering a normal temperature and at four or six o'clock in the afternoon a temperature of  $99.6^{\circ}$  to  $100.5^{\circ}$ , with a corresponding pulse, followed on the fifth morning by a temperature of  $98.6^{\circ}$  or  $99^{\circ}$  and an afternoon record of  $100.5^{\circ}$  or even higher, we may safely conclude that some infective absorption is occurring. These symptoms call for investigation to determine whether there is some other condition present to account for the temperature elevation. It frequently occurs that the afternoon temperature on the fourth, fifth, and sixth post-operative days may be  $99^{\circ}$  to  $99.6^{\circ}$  and the wound still found to be sterile.

Again, although the temperature may not reach over  $99.4^{\circ}$ , with pulse within bounds, the patient may complain of stinging, burning, and soreness in the wound that at times is very painful and annoying. Such a condition also calls for investigation.

The soiling of the dressings or the appearance of a discharge under the sides of the dressing likewise demands prompt investigation even though the temperature and pulse be normal.

When infection has occurred in a clean wound it is treated as an infected wound. The sutures may be entirely or only partly removed, the wound thoroughly cleansed, frequently swabbed with iodine, and a moist alcohol dressing applied. It is then the surgeon's endeavor to cause healing by second intention. Often extensive infection occurs, with sloughing of skin, fascia, and even muscle, so that repair is a long-drawn-out process.

When a wound which we have every reason to believe should have united by first intention becomes infected, every procedure of the operation should be checked over to ascertain where the break in our chain of aseptic technique occurred, in order to avoid such an error in the future.

While the theory is advanced that infection may arise from within or be introduced from without, a break in the chain of asepsis during the operation may be credited as the most frequent cause.

#### REQUIREMENTS FOR A DRESSING

The "doing of a dressing," while comparatively simple, calls for a definite procedure to conserve the time of the surgeon performing it.

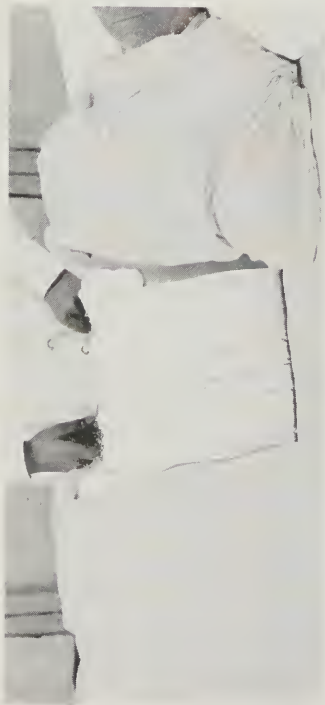


FIG. 89.—BEDCLOTHES TURNED BACK TO EXPOSE ABDOMEN. ARMS AND HANDS FOLDED UNDER THE NIGHTGOWN.



FIG. 91.—NURSE REMOVING SOILED DRESSING PAD.

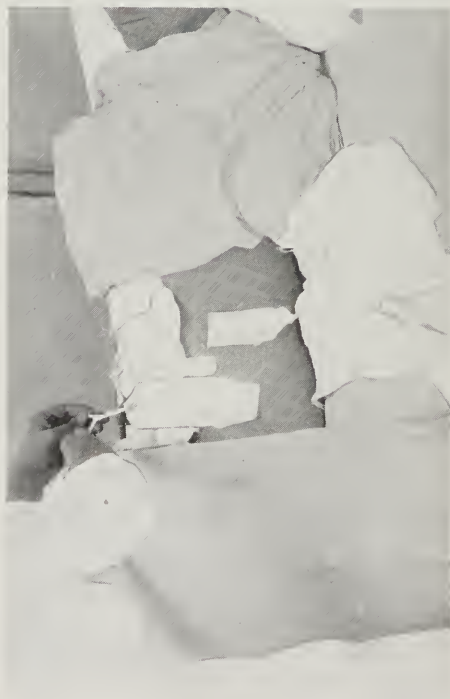


FIG. 90.—BINDER LOOSENED. NURSE UNTYING ADHESIVE TAPES.



FIG. 92.—PUTTING SOILED DRESSING PAD IN PAPER BAG.



FIG. 95.—FIELD PROPERLY DRAPED WITH STERILE TOWELS. DRESSING SUPPLIES READY FOR THE SURGEON.



FIG. 96.—SURGEON REMOVING PROXIMAL DRESSINGS.

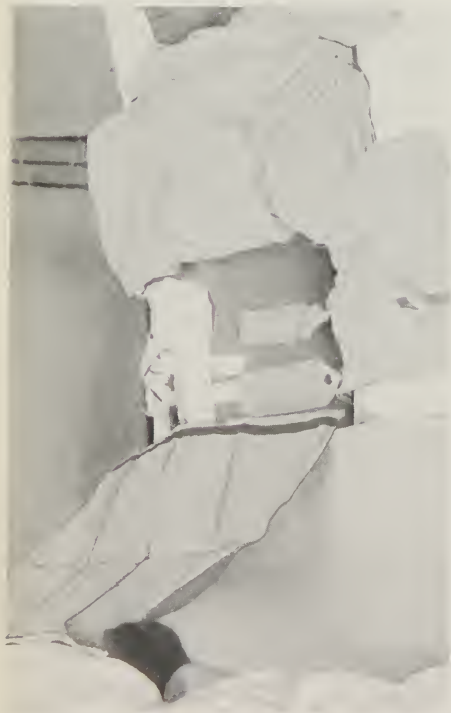


FIG. 93.—PLACING FIRST STERILE TOWEL.



FIG. 94.—TUCKING IN STERILE TOWEL.





FIG. 97.—REMOVING IMMEDIATE WOUND DRESSING AND ADHESIVE PLASTERS.



FIG. 99.—CLEANSING WOUND.

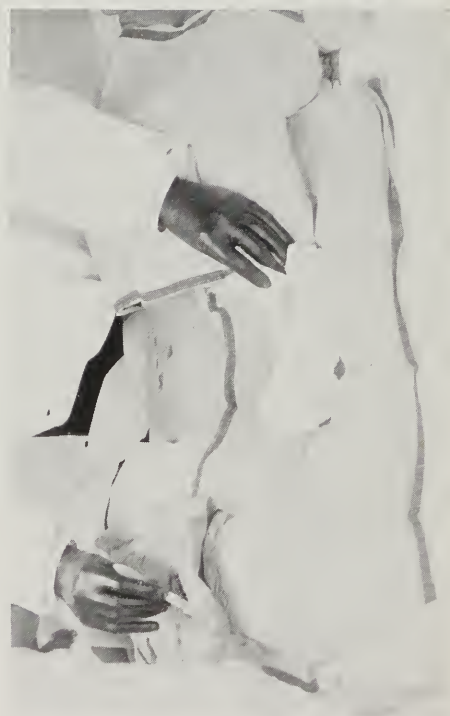


FIG. 98.—SURGEON REMOVING TISSUE FORCEPS FROM INSTRUMENT ROLL. WOUND ENTIRELY EXPOSED.



FIG. 100.—PACKING WOUND WITH STERILE GAUZE FROM TUBE HELD BY THE NURSE.



FIG. 103.—APPLYING GAUZE DRESSINGS.



FIG. 104.—GAUZE DRESSINGS IN PLACE.



FIG. 101.—WOUND PACKED WITH GAUZE.



FIG. 102.—DRAWING EDGES OF WOUND TOGETHER WITH ADHESIVE.





FIG. 107.—NURSE REAPPLYING BINDER.



FIG. 108.—DRESSING COMPLETE.

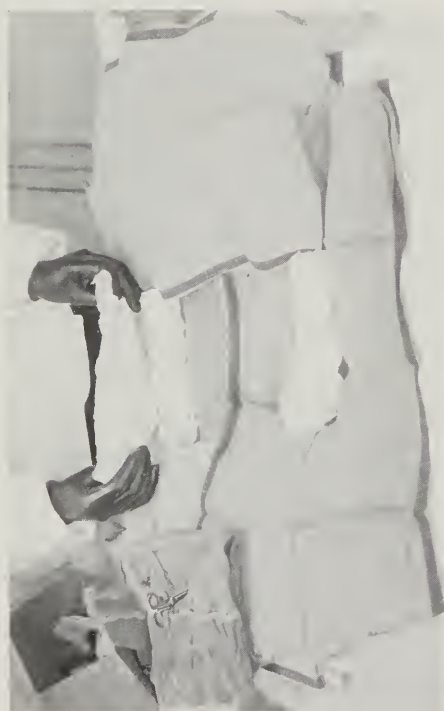


FIG. 105.—APPLYING STERILE PAD.



FIG. 106.—TYING ADHESIVE TAPES.

When a nurse knows that a dressing is to be done or sutures removed she should prepare the following articles (Fig. 8o):

- Sterile towels and gloves.
- Instruments, consisting of scissors, grooved director, tissue forceps, and probe, all to be sterilized by boiling.
- Sterile dressings. Adhesive plaster.
- Packing or drainage material.
- Solutions and 70 per cent. alcohol.
- Paper bag to receive soiled dressings.

While the surgeon is preparing his hands the nurse prepares the patient. After removing the binder, the field is surrounded with the sterile towels, the tapes are untied, the pad removed, and the adhesive straps holding the proximal dressing loosened; these dressings are not removed. The patient is instructed to keep her hands above her head. The contents of the sterile-dressing package are laid upon the sterile towels so that they will not come in contact with the nurse's hands and thus be rendered unsterile. The basin containing the instruments is placed within convenient reach. The nurse now directs her attention to waiting upon the surgeon.

The surgeon will remove the proximal dressings and, if he deems proper, the sutures. He will then cleanse the wound with alcohol and reapply the dressings.

If it is a dressing in which drainage is employed, the surgeon will cleanse the wound with the preferred solution, probably irrigate it, and perhaps apply a stimulating lotion or repack it with gauze.

As a container for soiled dressings, nothing is as convenient as an ordinary paper sack. When the dressing is completed, the bag in which the soiled material has been placed may be destroyed in the stove or furnace.

The nature of the dressing will determine whether the nurse should have in readiness an irrigating syringe and solution, the desired drainage or packing material, or such other supplies as the surgeon indicates.

Whenever the surgeon or the nurse performs a dressing, record should be made on the chart of the time the dressing was done, who performed it, the condition of the wound, the nature and amount of discharge, and the progress of healing. When sutures are removed, the item should be entered on the chart.

In this chapter we have endeavored to present the subject under discussion in a general way. The nurse who familiarizes herself with this information will be able to intelligently observe the progress of the process of repair and aid the surgeon and patient to expedite the healing process. Individual cases, to be sure, will demand varied care, but as a rule the procedure will conform to the general principles that have been advanced.

## CHAPTER XI

### ANESTHESIA

The facts and historical details surrounding the discovery of an anesthetic agent and its primal demonstration in Boston in 1846 are so well known to each individual in any way immediately connected with surgery and its operative technique that it is unnecessary to discuss this phase of the subject. That which concerns us most is what the experiences of the past have taught us, what anesthetic agent is the one of choice, and what our duty is during its administration.

From the voluminous literature upon the subject, based upon the records of administration in thousands and thousands of cases, there has been evolved a fairly universal unanimity of opinion, and by the light of that experience we are enabled to lay down dependable facts to guide our procedures.

Experimental excursions have been made in many directions. Combinations of chemical substances have been compounded, used, and ultimately discarded. Apparatus varied in styles, principles, and purposes have been invented, exploited, and cast into the junk pile.

Preanesthetic medication and complicated antagonists and incompatibles have been recommended only to be finally condemned. New avenues of introducing the anesthetic into the system have been suggested and found wanting or impracticable. Thus has the pendulum swung to and fro in the eager search and enthusiastic attempt to cast the old aside for something new.

These investigations, experiments, and discussions have had their value and serve to enable us to make definite deductions. They justify the present-day attitude toward the anesthetic of choice and safety and its mode of administration. We are enabled thereby to make authoritative statements to our patients.

Without entering into a minute discussion of the agents or methods

of administration, it will be my purpose to impart working and essential facts regarding the more frequently employed agents and their method of administration.

### ETHER

Ether is conceded to be the safest anesthetic agent known. The death rate following its administration is from 1 in 5000 to 1 in 10,000. It is best administered by what is known as the open method—with an abundance of air. Its administration by experts eliminates all the unpleasantness that has been attributed to it. Its after-effects may also be reduced to but transient states of minor concern.

Ether should be slowly administered with an abundance of air and never crowded. Fifteen to twenty minutes should be utilized in producing a state of complete anesthetization in a patient.

Its use should be preceded by a hypodermic of atropin, grain  $\frac{1}{150}$ , combined with small doses of morphin unless a distinct counterindication exists to the use of this adjuvant.

Ether should never be administered in a room in which there is any open fire or flame, as its volatility may cause an explosion or fire.

### CHLOROFORM

Chloroform today is regarded as the most dangerous of anesthetics; it is attended with a death rate of 1 in 1000 to 1 in 3000. Were it not for this high mortality, chloroform would at once become the agent of supreme choice by reason of its other qualities of efficiency, comfort, and simplicity. It is these qualities that have caused its extensive employment in the past. However, the fatalities of the past conclusively force us to declare that the time is at hand when chloroform must absolutely be discarded. One is no longer ever justified to resort to, or continue in its use.

### NITROUS OXIDE GAS

Next to ether, nitrous oxide gas anesthesia commends itself. Its use, however, is limited in many respects.

The foregoing are the three anesthetic agents employed and from that group chloroform must be removed. Of the remaining agents ether

has been introduced into the system by the intravenous, rectal, and intratracheal insufflation routes singly or combined with other agents.

At present our attitude is: Ether for major and prolonged surgical procedures; gas for short anesthetics or in urinary insufficiency.

Much has been said lately in regard to scopolamin and morphin—"twilight sleep"—alone or preceding ether. The profession is agreed that it is a dangerous and unreliable agent.

#### SPINAL ANESTHESIA

Spinal anesthesia has been demonstrated to be more dangerous than chloroform and is accredited with one death in every five hundred administrations. This obviates the necessity of further discussion, as it is too dangerous to merit a place in surgery.

#### LOCAL ANESTHESIA

With the advent of novocain the employment of local anesthetics received a marked impetus. Properly administered it is practically devoid of all unpleasantness and dangers. It is indicated in numerous conditions and the more one becomes conversant with its possibilities the more frequently it is employed; operations of great magnitude are performed with its aid.

To understandingly use and inject it one must be thoroughly conversant with the anatomical distribution of the nerves supplying the part subjected to surgical entrance.

While various combinations of drugs have been used with novocain the employment of simple normal saline as a dissolvent to the strength of 0.25 to 0.5 is most satisfactory. In this strength six to eight ounces have been injected with no untoward effects. Adrenalin or epinephrin may be added to this solution but should never be employed in strengths exceeding 1 in 200,000.

The solution when administered must be sterilized. This is accomplished by boiling for a period not to exceed ten minutes. Stock solutions are unsatisfactory. A fresh solution is preferable.

While rectal, intrapharyngeal, intratracheal, intravenous routes of



administration are employed and various mixtures and sequences are utilized by various surgeons and clinics, their purposes and technique of administration are so complicated and entail such extensive experience, that it is unnecessary to enter into a description of these anesthetic bypaths.

Bevan<sup>1</sup> has most admirably summed up the present-day attitude of surgeons in the determination of the choice of anesthetic as follows:

1. Drop ether should today be chosen as the standard general anesthetic when a prolonged anesthetic is desired with relaxation and unconsciousness.

2. Intrapharyngeal ether should be chosen in mouth and jaw cases when it is desirable to remove the anesthetist and anesthetic apparatus from the operative field.

3. Gas should be chosen in short anesthetics in which unconsciousness is desired, and in special cases, such as kidney insufficiency.

4. Local infiltration anesthesia should be chosen when the surgeon has the full coöperation of the patient and the field of operation can be completely anesthetized.

**The Duty of the Nurse.**—Formerly it was the custom to delegate a nurse to the sole duty of watching and recording the pulse of the anesthetized person and to report its quality and rapidity to the administrator. With the advent of trained and skilled anesthetists the “nurse-sentinel” was discharged. The trained anesthetist exercises a watchful alertness for danger signs and warning. It is only when serious emergencies arise that the nurse is called upon to render assistance, and her efforts are always subservient to the orders of the anesthetist.

She will be called upon to administer the indicated respiratory or circulatory stimulant. The stimulating drugs most commonly employed are camphor oil, whiskey, strychnin, digitalin, nitroglycerin, adrenalin and atropin. They are given hypodermatically. Saline either subcutaneously or intravenously is frequently resorted to, and the nurse should be able to rapidly undertake the necessary preparatory steps for its administration. Artificial respiration may be necessary but will probably be

<sup>1</sup> Jour. A. M. A., Vol. LXV, No. 17.

undertaken by the anesthetist and surgeon. Rectal dilatation and stimulating enemata may likewise be resorted to, but the desired fluid will be indicated by the anesthetist or surgeon and its administration supervised.

Fortunately, collapse from oversaturation by the anesthetic agent is being met less frequently by reason of skilled administration, and emergency methods of resuscitation are now but rarely needed. The importance of having a skilled and experienced anesthetist is receiving greater recognition and as we insist upon his employment the emergency need of instituting resuscitating measures will become less frequent. A competent anesthetist is as important as a competent surgeon. The excuse of employing an incompetent anesthetist is but rarely justified.

**Post-anesthetic Distress.**—In spite of careful preoperative preparation, skilled administration, and minimum dosage, we meet with varying frequency certain post-anesthetic distress, foremost of which is the nausea and vomiting. One patient will give but transient and brief evidence of such discomfort while another will be extremely depressed and distressed by stomach irritation.

Patients will likewise be met who suffer from intense headache following the return of consciousness. With the headache, complaint will also be made of some deafness, ringing in the ears, and possibly some evidence of delirium. Herpes of the mouth and nares may appear. A conjunctivitis, if the eyes were not protected, may be present and be productive of extreme discomfort. There are also certain physical discomforts, such as backache and arm and leg crampings.

In addition there is encountered pharyngolaryngitis, bronchitis, and pneumonia due to the inhalation of the anesthetic vapor.

There will be found those who are hysterical, exalted, elated, talkative, or dejected for periods of varying length. Likewise there will be met the pugnacious, ugly individual who requires restraint.

Enumerated, the post-anesthetic distresses consist of inflammation of the eyes, throat, and lungs, nausea, vomiting, herpes, mental exaltations or depressions, backache, and muscle crampings. The indicated treatment for these several conditions has been enumerated under post-operative care.

## CHAPTER XII

### THE NURSE'S CHART IN SURGICAL CASES

The nurse's chart and record in a surgical case should be more than merely a few notations recording temperature, pulse, respiration, and bowel movements in addition to other disconnected notations of the patient's post-operative progress. A chart should be so prepared as to impart intrinsic information that is of value to the attending surgeon and physician, and thus accurately and in detail enlighten them as to their patient's condition during every hour that has elapsed since their last visit.

A nurse is often judged by the chart that she keeps. It often reflects the training that a nurse has received. Further, it imparts to the surgeon evidence as to whether or not his patient is under the care of a careful, observing, and intelligent nurse, or one who lacks these qualifications. As such, it is then of greatest importance that every nurse make it one of her first duties to observe and concisely, yet distinctively, record in consecutive order the salient and important symptoms, observations, and treatment that is administered during the time that passes between the visits of the surgeon.

This is a matter that is often overlooked. Weariness and long exhausting hours of constant vigilance with every moment occupied, tend to beget carelessness with resultant meager, often meaningless, records. These deficiencies may be overcome if the nurse will but remember the essentials of charting, and, by following a definite plan and the use of a few descriptive adjectives, record her observations and work. It must be remembered that a chart is to be a complete and detailed record of a patient's illness and that to be of value it must impart intelligent information.

It will be our intention in this chapter to indicate a few of these details, and by the use of pertinent illustrations demonstrate how a chart may be made more valuable, and how, by the use of a word or two, meaningless

notations may be made more intelligent and helpful. In the end it depends upon the nurse's ability whether her chart records possess merit or demerit; it is incumbent upon her to possess the personal ability to attain these qualifications. We can only point out the way and hers is the responsibility of acquiring the final perfection.

#### TEMPERATURE, PULSE, RESPIRATION

The frequency of these records should be in accordance with the surgeon's orders. The usual rule is:

**Temperature** to be recorded every three hours. When unlooked-for complications arise it should be recorded every hour. Mere figures only impart partial information. They may be made more intelligent if the following specifications be used: "Chill," "Before Bath (B. B.)," "After Bath (A. B.)," "Rectal," "Axilla," or "After Dressing."

**Pulse.**—The pulse should be recorded every ten minutes during the first post-operative hour; every fifteen minutes during the second, third, and fourth post-operative hours or until complete reaction and consciousness ensue; every half hour for the next six hours; hourly during the second day; every three hours thereafter. Should the condition of the patient be unsatisfactory frequent records of the pulse should be made. It must be remembered that a pulse of 120 requires careful watching; a pulse of 140 requires anxious watching, and a pulse of 160 that does not fall to within bounds in four to six hours usually foretells impending death. Here also mere numbers are of but partial value and alone are not indicative of satisfactory conditions. An intermittent, small, weak pulse of 100 beats may be just cause for uneasiness. A full, bounding, high-tension pulse of 60 or 70 may be a danger signal. A nurse should be on guard for the detection of these conditions and render her chart more intelligent by qualifying the mere figures thus:

120, soft, compressible.

140, small, running.

76, high tension, full.

96, irregular, with momentary accelerations.

By so doing she will impart early warning to the surgeon whereby he

Nurse's Record				Nurse's Record	
Patient				Nurse	
Miss J. H. Summers				Miss Hamilton	
July 22	8:15	10:12	34	<p>Room 8. Patient admitted - Ambulance. Pulse full, low tension. Pale and anemic mucous membranes. Vaginal discharge - dark. Cleansing bath. Catheter - Spec. to Laboratory. Vulva and abdomen shaved. Hypodermic. Patient sent to operating room.</p>	
	9:00			<p>Atropine <math>\frac{1}{150}</math></p>	
	9:30	10:14	20	<p>Operation. Surgeon - A. R. Filmore. Asst. - Brown &amp; Hilton. Anesthetist - Harris. Nurses - Clark, Williams, Abbott. Miss Cheney Surgical Supervisor. Present - Mr. Summers &amp; Mrs. Jones. Operation - Ruptured extrauterine pregnancy. Anesthetic - Ether - Began 9:40 - Stopped 10:30. Incision - 9:45 - Closed 10:30. Right tube &amp; ovary removed - <math>\frac{3}{4}</math> of clotted blood from abdomen. Rubber tube drain - Caudesac. - Abdomen flushed with saline solution. Sutures - 3 S.W. 5. - Catgut. Specimens to Laboratory. Stimulants - 400 c.c. Saline Sub Q. Styph. <math>\frac{1}{30}</math> - Hyfo. Camp Oil. One ampule - Hyfo.</p>	
	10:45			<p>Returned from operating room. Pulse is small - Patient perspiring freely - Rectal saline started. Hyfo. Foot of bed elevated. Full - Better quality. Patient partly awake. Patient - Awake - Restless. Good quality. Room changed - Ceased perspiring. Rectum - Saline retained. Sleeping.</p>	
	10:45	11:18	28	<p>Atropine <math>\frac{1}{150}</math></p>	
	10:55	12:0			
	10:55	12:0			
	11:00	12:0			
	11:10	12:6			
	11:20	12:8			
	11:30	12:6			
	11:40	12:4	24		
	11:50	12:0	24		
	12:00	12:0	20		
	12:10	12:0	20		
	12:20	12:0	20		
	12:30	12:0	20		
	12:40	12:0	20		
	12:50	12:2	24		
	1:00			<p>Pulse - Full - Stronger</p>	
	1:15	12:4	26	<p>Awake - Slept 1 hour. Complaints of pain and thirst. Back rubbed with alcohol. No nausea. Restless - Thirsty. Hyfo. Rectum - Urinary - Pulse good. Hyfo.</p>	
	1:30	12:4	26	<p>Water <math>\frac{3}{4}</math></p>	
	1:45	12:4	26	<p>Water <math>\frac{3}{4}</math></p>	
	2:00	12:6	24	<p>Styph. <math>\frac{1}{40}</math></p>	
				<p>Morph. <math>\frac{1}{8}</math></p>	
	2:15	12:2	20		
	2:30	12:8	18		
	2:45	12:6			
	3:00	12:18			
	3:15	12:18			
	3:20			<p>Water <math>\frac{3}{4}</math></p>	
	3:30	12:20		<p>Water <math>\frac{3}{4}</math></p>	
	3:45				
	4:00	12:0			
	4:15	12:18			
	4:45	12:18		<p>Water <math>\frac{3}{4}</math></p>	
	5:15	12:0		<p>Water <math>\frac{3}{4}</math></p>	
	6:00	12:0		<p>Styph. <math>\frac{1}{40}</math></p>	
	6:30	12:18		<p>Water <math>\frac{3}{4}</math></p>	
	7:00	12:20		<p>Hot tea <math>\frac{3}{4}</math></p>	
	7:30	12:20			
	8:00	12:20		<p>Albumen <math>\frac{3}{4}</math></p>	
	8:30				
	9:00	12:18		<p>Water <math>\frac{3}{4}</math></p>	
	9:30	12:20		<p>Hot tea <math>\frac{3}{4}</math></p>	
	9:30				

RECORD OF ACTUAL SURGICAL CASE SHOWING DETAILS AS RECORDED BY THE NURSE.



## NURSE'S RECORD

Date: 10/12/12

Mrs. H. Summers				Seymour				Miss Hamilton			
	10.00		110								
	10.30		116								
	11.00	100	114 20								
	11.30		118								
Nom	12.00			Struch. 1/40							
	12.30										
J M	1.00	101	116 26								
	1.30		116 26	Morph. 1/8							
	2.00		110 22								
	2.30		108 20								
	3.00		108 18								
	3.15										
	3.30	101	117 20								
	4.00		104 20	Struch. 1/40							
	4.30		106	Saline 3/100							
	5.00		108 22								
	5.30	101	105 24								
	6.00		110 22								
	7.00		114 24	Struch. 1/40							
	7.30	101	116 20								
	8.00										
	8.30		114 22								
	9.00	100	112 20	Codine - Hyfo - grs							
	9.30		108								
	10.30										
Night	12.00		104 18	Struch. 1/40							
	12.30		102 18								
Night	1.00	99	92 16	Jab. R. #1							
A M	8.00										
	8.30										
	9.00		92	Jab. R. #1							
	10.00										
	11.00	99	110 20	Jab. R. #1							
	12.00										
J M	12.30			Jab. R. #1							
	1.00		92 86 18	Jab. R. #1							
	3.00			Jab. R. #1							
	4.00	99	96	Jab. R. #1							
	5.00										
	5.30										
	6.00	99	94 18								
	7.00										
	9.00	99	92 18								
	10.00			Trimal, grs. X							
	11.00		86 16								



may forestall disaster by early and prompt treatment. Again she may prevent his having any uneasiness if, when she notes that at a certain hour a pulse that had previously been recorded at 78 suddenly rose to 100 or 110 and in an hour or two subsided, she writes: "Patient annoyed by workmen in the building," or, "Complained of distress after taking a cathartic." This will indicate to the surgeon that minor conditions occasioned the rise and that it was not due to possible impending complications. He will also by a word give instructions as to how to prevent similar recurrences.

The foregoing indicates how by a word or two intelligence and more meaning may be incorporated in, and added value be imparted to, a record. Try to make your record impart the greatest amount of information possible, always, however, avoiding verbosity. Discriminate between essentials and nonessentials.

**Respiration.**—The rate of respiration is customarily recorded at the same time as the temperature. These should also be described as the case may be by the use of: "Stertorous," "Shallow," "Labored," "Cheyne-Stokes," etc. Especially when pulmonary complications exist or threaten should one record specific information as to the character and nature of the patient's respiration.

#### BOWEL AND KIDNEY EXCRETIONS

These observations are of utmost importance and are overlooked or carelessly recorded by most nurses, many of whom are laboring under the impression that a mere check mark in the proper ruled space is all-sufficient. If this has been your attitude we earnestly recommend that in all future cases you record these alvine discharges more carefully. While there is some satisfaction to a surgeon in knowing that an evacuation has occurred, still the nurse will assist him to a greater extent if she will explain thus: "Liquid," "Soft," "Hard," "Light," "Gray," "Green," "Normal," "Purulent," "Blood," "Large amount of mucus," "Very offensive," "Well digested," "Undigested," "With much flatus," etc. A word or two will impart the essential and obviate much needless question-

ing or personal examination. One should also note with all bowel movements the effect that it produces upon an abdomen that is distended.

**Urine.**—The amount of urine voided must be accurately measured and recorded. The total amount passed during twenty-four hours should be summarized at the end of a day's record. The action of the anesthetic agent has a tendency to cause a transient suppression and more or less anuria. If this is neglected or permitted to continue undetected, permanent suppression followed by death may result. If the failing kidney action is discovered early, the prompt recourse to those measures calculated to reestablish normal function will usually prevent a fatal termination. We cannot emphasize too strongly the necessity for careful observation of kidney secretion. The normal amount of urine that is secreted in twenty-four hours is from forty-eight to sixty ounces. For one or two days, post-operatively, it may fall to twenty-four or thirty-two ounces for each twenty-four hours. When the amount voided falls below this latter amount the surgeon's early attention should be secured and prompt notification be given him at the least variance from the normal. The record may be made more intelligent if the nurse will but add a descriptive word to the number of ounces voided. "Dark," "Offensive," "Scalding," "Frequent," "Difficult," "Catheterized," "Involuntary," etc., add additional meaning to the figures set down. When securing specimens of urine for laboratory examination always specify whether it is a voided or a catheterized specimen,—especially in gynecological cases or in operative work upon the genitourinary tract. A nurse should frequently review her lectures on urinalysis in order that she be constantly familiar with the varying characteristics of voided urinary specimens and thus be enabled to detect and properly interpret them upon her record.

#### SLEEP—REST

The mere fact that a patient lies with eyes closed does not warrant the record of "sleeping." Again, because a patient does not close his eyes does not imply that he is not resting. When making your record of sleep be specific and state, "Normal," "Restless," "Fretful," "Heavy," "Frequent Awakening," etc., and thus impart the essentials that are of

some meaning. When the sleep or rest has been unsatisfactory the cause should be sought for, and, when assured of its discovery, it merits recording so that when the surgeon notes it in his examination of the record he may be able to prevent it happening again by issuing the necessary orders.

#### NOURISHMENT

Whenever nourishment is administered it is important that not only its nature but also the actual amount consumed be recorded. If the patient is given a glass of milk there should be noted whether he consumed one ounce or six ounces. If the taking of any particular form of nourishment causes discomfort or distress it must be recorded. At the end of every twenty-four hours a summarizing of the total calories of foodstuffs consumed will be appreciated by the surgeon. In addition to the nourishment taken, be sure to chart the number of ounces of water that is drunk by the patient. The mere charting of "Soft diet," "Liquids," or "Light diet" does not convey to the surgeon whether or not his patient is securing the proper amount of nourishment. A record of the amount of water that has been drunk in twenty-four hours, added to the total caloric value of the food that has been eaten, will at a glance indicate to the surgeon whether his patient is receiving the proper amount of nourishment and will forestall the necessity of making detailed inquiry.

#### THE WOUND

In "clean cases" there will, as a rule, be no necessity of recording anything pertaining to the surgical field other than that the dressings have been regularly inspected by the nurse. The charting of "Wound painful" or "Little pain," as the condition may be, attests to the nurse's watchfulness. When the dressings have become disturbed and have been readjusted this fact should be noted. In cases where drainage is employed the character and the estimated amount of the discharges, as well as the frequency with which the dressings were renewed, are to be definitely recorded. "Dressings changed," or "Dressings soiled," do not mean much. How often were they changed and what was the nature of the discharge—blood, pus, serum, fluid—and what was the amount? These are pertinent observations. In changing the dressings when there is

drainage in the wound, it is well to note from time to time the condition of the drainage material and also that of the sutures that are in place. Never fail to promptly record the very first indication of commencing irritation or inflammation of the surrounding skin due to constant contact with wound discharges. It is equally important that record be made when the drainage material was removed. "Dressing done," means nothing. How and what was done is important and should be observed every time the dressings are removed and the wound exposed to the air.

In "clean cases" record the day when the stitches are removed and note the condition of the wound thus: "Union complete," "Union by second intention," "Wound broken down in center," etc.

#### MISCELLANEOUS DETAILS

Under this heading we propose to indicate but briefly several apparently minor details which are, however, of greater or less importance in every surgical case and which a surgical nurse will be called upon at intervals to include in her chart, or which will serve to enable her to add increased value to her chart.

**Days.**—Always at the beginning of a new record-sheet note the day that the sheet covers following the operation, as, Fifth Day. It facilitates the reading of a chart if one uses black ink for the records made between 7 a.m. and 7 p.m., and red ink for the hours between 7 p.m. and 7 a.m.

**The Operation.**—Have your chart record the day and hour your patient was sent to the operating table together with the following details of the operation: Names of the surgeon and his assistants and the anesthetist; nurses present; time of operation; duration of operation; anesthetic agent employed; nature of operation and what organs or tissues, if any, were removed; suture material used in closing the wound and, if drainage is used, state its nature, amount, and how used; what disposal was made of the specimens; condition of patient during operation; pulse before and at the completion of the operation; pulse and condition of the patient when returned to bed; stimulation that was administered, if any.

**Medication.**—Whenever any medicine is given, always state specifically the time, how, and what was given. Never permit your chart to contain the phrase, "Medicine given as ordered."

These are all little things, you say, but it is these very little things and the attention that a nurse directs to them that tend to rate you as a competent, observing, and careful nurse and cause your services to be sought by surgeons. There is nothing more annoying than to pick up a meaningless chart and be compelled to ask numerous questions in order that it may be properly interpreted. There is also nothing so satisfying as to know that one's patient is under the care of a watchful nurse. It is yours to choose whether you will be classed as an excellent or poor surgical nurse, and yours also to attain such approval by the care and studied thought with which you write your charts.

## CHAPTER XIII

### FORMULÆ, ETC.

#### MUSTARD PLASTER

For an adult, use 1 part of mustard to 4 or 6 parts of wheat flour; for a child, 1 part of mustard to 8 parts of flour. Mix the dry flour and mustard, wet with lukewarm water, and spread evenly over half a piece of muslin, leaving a wide margin. Fold the other half of the muslin over the paste and bring the margins over the sides to retain the mixture. The white of an egg added to the paste will reduce the danger of blistering.

#### FLAXSEED POULTICE

Linseed meal.....	$\frac{2}{3}$ cup
Boiling water.....	1 cup

Sprinkle the linseed meal into the boiling water and stir constantly to prevent lumps. When thick enough to drop, not run, from the spoon, remove from the fire and beat vigorously until sufficient air has been incorporated into the mixture to make it light. Spread not less than one-half inch thick on muslin, leaving an ample margin. Cover with a piece of gauze and fold the margin of the muslin over the poultice so that none of the mixture can escape. Carry to the bedside in a heated dish or rolled in a hot towel.

#### MUSTARD POULTICE

For an adult, a mustard poultice should contain 1 part of ground mustard to 8 parts of flaxseed meal; for a child, 1 part of mustard to 12 parts of flaxseed. Prepare a flaxseed poultice, and stir in the dry mustard after removing from the fire. Spread evenly on half a piece of muslin and completely cover with the other half.

#### TINCTURE OF IODIN

Tincture of iodine is often used as a counterirritant. Apply with a pledget of cotton or a gauze sponge on an applicator and allow it to dry. As the tincture spreads freely, the site may be surrounded with cold cream to limit the area of application. Let dry before making a second application if such is required. One application daily is usually all that is prescribed.

#### TURPENTINE STUPES

Mix olive oil and turpentine (for adults, 3 or 4 parts of oil to 1 of turpentine; for children, 8 to 10 parts of oil to 1 of turpentine), apply to the part, and cover with a hot fomentation. Or, add one teaspoon of turpentine to a pint of boiling water, mix thoroughly, put into it the flannel, and stir until the flannel is thoroughly saturated. Wring out and apply.

### CHEMICAL DISINFECTANTS AND ANTISEPTICS

#### ALCOHOL

70 per cent. for skin disinfection.

70 per cent. to 95 per cent. for surgical instruments, needles, and dishes which are free from albuminous matter.



BICHLORID OF MERCURY

Bichlorid of mercury is limited in its use as a disinfectant because it is precipitated in the presence of albuminous matter and corrodes metals. For these reasons it is not adapted to the disinfection of feces and sputum nor the sterilization of instruments. It is used in the following strengths:

- 1 in 1000 for clothing, bedding, linen, handkerchiefs.
- 1 in 1000 for floors, furniture, walls.
- 1 in 1000 for skin disinfection.
- 1 in 3000 to 1 in 1000 for the hands.

*Standard Bichlorid of Mercury Solution, 1 in 1000*

Water (which has been boiled).....	1 pint
Bichlorid of mercury.....	7.3 grains
Common salt.....	14.6 grains

*1 in 2000 Bichlorid of Mercury Solution*

Add 1 part of the standard solution to an equal part of boiled water.

*1 in 3000 Bichlorid of Mercury Solution*

Add 1 part of the standard solution to 2 parts of boiled water.

*1 in 5000 Bichlorid of Mercury Solution*

Add 1 part of the standard solution to 4 parts of boiled water.

BORIC ACID

- Saturated solution diluted one-half for an infant's eyes and mouth.
- Saturated solution for all other purposes.

CARBOLIC ACID

Carbolic acid has a wide range of use as a germicide because it does not actively coagulate albumin nor destroy colors, wood, metal, or fabrics in the usual strengths employed. For disinfection in smallpox, scarlet fever, measles, and syphilis it is said to be unreliable. With these exceptions it can be depended upon for use in the following strengths:

- 5 per cent. for dishes, utensils, floors, woodwork, clothing, bedding, feces, urine, and vomitus.
- 3 per cent. to 5 per cent. for the hands.

*3 Per Cent. Carbolic Acid Solution*

Water.....	1 quart
Carbolic acid.....	1 ounce (2 tablespoons)

*5 Per Cent. (1 in 20) Carbolic Acid Solution*

Water.....	1 quart
Carbolic acid.....	1½ ounces (3 tablespoons)

To prevent burning, carbolic acid solution should be thoroughly mixed before using. Alcohol is an antidote for carbolic acid burns.

CHLORINATED LIME

- Chlorinated lime can be used either in solution or, for excreta, as a dry powder.
- 3 per cent. for feces, urine, sputum, and bath water.

*3 Per Cent. Chlorinated Lime Solution*

Chlorinated lime.....	3 ounces
Water.....	1 gallon

## FORMALIN

Formalin is a deodorant as well as a disinfectant and does not lose its disinfecting properties in the presence of albuminous matter. Hot formalin injures iron and steel but it is not injurious to brass, copper, nickel, and other metals. It is not destructive to fabrics and does not affect colors.

10 per cent. for clothing, bedding, linen, handkerchiefs, dishes, utensils.

10 per cent. for feces, urine, sputum, vomitus.

*10 Per Cent. Formalin Solution*

Formalin.....	13 ounces
Water .....	1 gallon

## LYSOL

Lysol is a more powerful germicide than carbolic acid and in the strengths used is nonirritating.

2 per cent. for sputum, and let stand for one hour.

2 per cent. for utensils, woodwork, dishes, and rubber articles.

## NORMAL SALT SOLUTION

Common salt.....	46 grains
	(slightly less than a level teaspoon)
Water.....	1 pint

## METHODS OF DISINFECTION

## TO DISINFECT WATER

Boil thirty minutes. Water used for bathing in an infectious or contagious disease may be disinfected by milk of lime (containing 1 part of freshly slaked lime to 4 parts of water). Add an equal amount of freshly prepared milk of lime to the water to be disinfected and let stand for not less than two hours.

## TO DISINFECT TABLEWARE AND UTENSILS

Boil thirty minutes, or, if preferred, soak in 5 per cent. carbolic acid solution, 10 per cent. formalin, or 2 per cent. lysol.

## TO DISINFECT CLOTHING

Immerse in carbolic acid, 5 per cent., or formalin, 10 per cent. for two hours, or boil for from one-half to one hour.

## TO STERILIZE TOWELS, GAUZE, ETC.

Wrap loosely in small packages and boil thirty minutes. To dry, after boiling, wrap packages in several thicknesses of paper and bake in a slow oven. Small pieces of clean gauze (one thickness) may be sterilized by moistening and ironing with a scorching hot flatiron.

## TO DISINFECT SPUTUM

Receive in paper sputum cups and burn immediately, or add formalin, 10 per cent., chlorinated lime, 3 per cent., or lysol, 2 per cent., and allow to stand for one hour.

## TO DISINFECT FECES

Incorporate an equal quantity of a disinfecting solution and allow to stand for from one to two hours, according to the disinfectant used. The disinfectant and feces should be thoroughly mixed. Use one of the following solutions: 10 per cent. formalin for one hour, 5 per cent. carbolic acid for from one to two hours, 3 per cent. chlorinated lime for at least two hours.

## TEMPERATURES OF WATER FOR BATHS, APPLICATIONS, DOUCHES, AND ENEMAS

As a rule, determine all temperatures by a bath thermometer and not by the hand.

Very cold.....	32° to 55°F.
Cold.....	55° to 65°F.
Cool.....	65° to 80°F.
Tepid.....	80° to 92°F.
Neutral.....	92° to 95°F.
Warm.....	92° to 98°F.
Hot.....	98° to 104°F.
Very hot.....	104° and above

## ENEMATA

## Classification of Enemata.—

*Anthelmintic*: given to destroy worms.

*Antiseptic*: given to destroy worms.

*Astringent*: given to contract the tissue and superficial capillaries in cases of hemorrhage and forms of diarrhea.

*Carminative*: given to relieve flatulence.

*Emollient*: given to soothe irritation of the mucous membrane of the intestines.

*Nutritive*: given to afford nourishment.

*Purgative*: given to increase peristalsis and wash the intestines.

*Sedative*: given as a sedative, general and local.

*Stimulating*: given for general stimulation.

*Saline*: given to replenish body fluids and for stimulation.

## STIMULATING ENEMA

1. Saline.....	℥ viij
Coffee.....	℥ viij
Whiskey.....	℥ ss
Temperature.....	105°F.
2. Normal saline.....	O j
Temperature.....	105°F.
3. Whiskey.....	℥ j
Black coffee.....	℥ iv
Liquid peptonoids.....	℥ ij
Normal saline, ad.....	O j
Temperature.....	105°F.

## GLYCERIN ENEMA

Glycerin.....	℥ ij
Water.....	℥ iv

## SALTS AND GLYCERIN ENEMA

Magnesium sulphate.....	℥ ij
Glycerin.....	℥ iv
Water, ad.....	O j

## OIL ENEMA

1. Warm olive oil.....	℥ vj
Followed by soapsuds and glycerin enema in one hour.	

2. Castor oil.....	℥ ij
Sweet oil.....	℥ ij
Glycerin.....	℥ ij
Water, q. s. ad.....	℥ j

## OIL AND TURPENTINE ENEMA

To oil enema add turpentine.....	℥ ss
----------------------------------	------

## CARMINATIVE ENEMA

1. Milk of asafetida.....	℥ viij
2. Turpentine.....	℥ ss
Water.....	℥ j
Milk.....	℥ iv
Molasses.....	℥ iv

## NUTRITIVE ENEMA

1. Egg.....	℥ i
Beef juice.....	℥ ij
Table salt.....	gr. xv
Peptonized milk.....	℥ vj
2. Liquid peptonoids.....	℥ ij
Normal saline.....	℥ ij
3. Egg.....	℥ i
Peptonized milk.....	℥ vj

**The Method of Administering Nutritive or Stimulating Enemata.**—Prepare the fluid and heat to 95°F. Place the patient on the left side with the knees flexed. Permit the fluid to flow through the tube to expel the air and then make pressure close to the point until ready to introduce it. Lubricate the catheter with vaselin or oil and insert gently six or eight inches. Do not slip the tube backward or forward as it increases peristalsis and induces the patient to expel the fluid which should be retained. Press the tube sufficiently to allow the fluid to run very slowly and occasionally make intermittent stoppage until it has been all given. Upon withdrawing the tube make digital pressure with a soft cloth against the anus for a minute or two. Give a rectal irrigation before a stimulating or nutritive enema unless otherwise ordered.

## SALINE ENEMA

Epsom salt (magnesium sulphate).....	2 ounces
Water.....	℥ quart

## MOLASSES ENEMA

Molasses.....	8 ounces
Water.....	℥ quart

## TURPENTINE ENEMA

Turpentine.....	℥ dram
Epsom salt.....	2 drams
Glycerin.....	4 drams
Warm water.....	4 ounces

Or

Turpentine.....	20 drops
Soapsuds.....	℥ pint

## FLAXSEED ENEMA

Flaxseed meal..... 8 ounces  
 Water..... 1 pint  
 Tie flaxseed in cheesecloth, boil for one hour, and strain.

## SEDATIVE (STARCH) ENEMA

Starch..... 1 ounce  
 Cold water..... Enough to soften  
 Boiling water.... Sufficient to make the consistence of thick cream when boiled.  
 Asafetida and laudanum may be added to this enema as prescribed.

## SOAPSUDS ENEMA

Warm enema, water at 98° to 100°..... 1 to 3 pints  
 Hot enema, water 105° to 110°..... 1 to 3 pints  
 Cold enema, water at 70° to 80°..... 1 to 3 pints  
 Retain for from 5 to 15 minutes.

## CHAPTER XIV

### PREPARATION OF SURGICAL MATERIALS

**Catgut (The Willard Bartlett Method).**—The gut is cut into desired lengths and made into coils which are hung on a thread, so that they can be conveniently handled. They are then placed upon asbestos in a hot-air chamber and the temperature is gradually raised during an hour to 180°F., during the next hour it is raised to 220°F. and continued at this temperature for thirty minutes. The gut is now transferred to an asbestos-lined kettle and placed in liquid alboline until it is clear in the sense that microscopic sections are clear; this requires twelve hours. The kettle is then placed upon a sand bath, and by gradually raising the temperature through a period of two hours the maximum temperature of 320°F. is reached, at which point it is kept. Brittleness results from raising the temperature too rapidly and exceeding the maximum temperature. The gut is finally stored in a solution of 1 part iodine crystals in 100 parts of Columbian spirit. To get rid of the excess of oil the gut is either allowed to drip or is rinsed in the storing solution.

**Catgut in Glass Tubes.**—Boil for five minutes before using or place in 1 in 500 corrosive sublimate for thirty minutes.

**Kangaroo Tendon in Glass Tubes.**—Never boil. Keep in 1 in 500 corrosive sublimate solution.

**Horsehair.**—To prepare horsehair for ligatures:

1. Wash thoroughly with soap and water.
2. Boil twenty minutes in 4 per cent. sodium bicarbonate solution.
3. Preserve in alcohol, 70 per cent.

**Silk Plaited or Twisted, Black Linen, and Pagenstecher's Linen.**—Wind on glass cylinders and boil vigorously (small sizes for twenty minutes, large sizes for thirty minutes) previous to operation, or, after winding silk on cylinders, place cylinders in glass tubes, plug tubes with



## MAKING GAUZE DRESSINGS

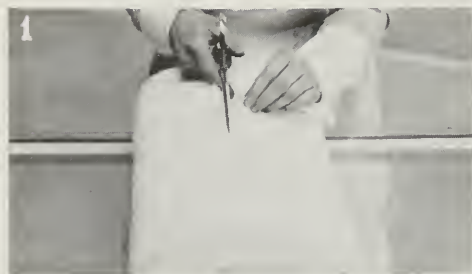


FIG. 109.—CUTTING LAYERS FROM THE BOLT OF GAUZE.

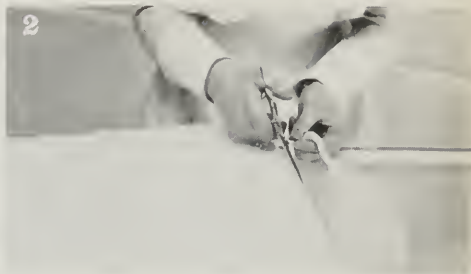


FIG. 110.—TRIMMING OFF THE FOLDED EDGE.

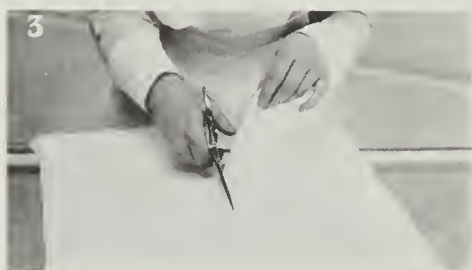


FIG. 111.—CUTTING THE GAUZE SQUARES IN HALF.



FIG. 112.—PLACING THE LAYERS IN ONE PILE.

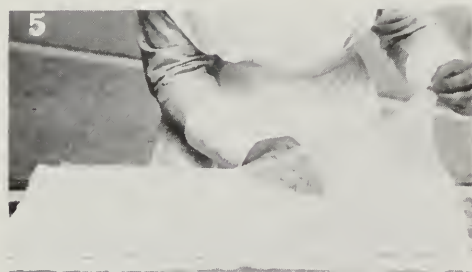


FIG. 113.—LIFTING A SINGLE LAYER.



FIG. 114.—FOLDING TOP LAYER TO ONE HALF.



FIG. 115.—FOLDING AGAIN INTO A NARROW STRIP.

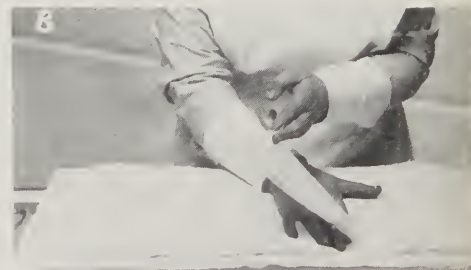


FIG. 116.—FOLDING OVER ONE THIRD OF STRIP.



FIG. 117.—FOLDING OVER OPPOSITE THIRD.



FIG. 118.—STRIP FOLDED, READY TO TURN INSIDE OUT.



FIG. 119.—FINGERS SEPARATING ONE LAYER OF GAUZE TO TURN INSIDE OUT.



FIG. 120.—TURNING INSIDE OUT, FIRST TIME.



FIG. 121.—DRESSING READY FOR SECOND TURN.



FIG. 122.—FINGERS UNDER TWO LAYERS TO TURN INSIDE OUT AGAIN.



FIG. 123.—TURNING INSIDE OUT.



FIG. 124.—DRESSING COMPLETED WITH RAW EDGES CONCEALED.

cotton, and sterilize with live steam at fifteen pounds pressure on two successive days.

**Silkworm Gut.—**

1. Cut off rough ends of the commercial silkworm-gut fibers.
2. Boil vigorously for thirty minutes in clean water.
3. Preserve in alcohol, 70 per cent.



FIG. 125.—CUTTING AND PACKING GAUZE DRESSINGS.



FIG. 126.—CUTTING AND PACKING GAUZE DRESSINGS (Continued).

### Rubber Tubing and Rubber Dam.—

1. Cut in lengths.
2. Blow out dust.
3. Boil in a 4 per cent. solution of sodium bicarbonate for twenty minutes.
4. Scrub and wash thoroughly with green soap.
5. Soak in corrosive sublimate, 1 in 500, for twelve hours.
6. Boil again for twenty minutes and place in 5 per cent. carbolic acid solution.

### Rubber Tissue.—

1. Wash and soak in green soap and cold water.
2. Rinse thoroughly with sterile water.
3. Immerse in corrosive sublimate, 1 in 500, for twelve hours.
4. Preserve in sterile normal salt solution.



**Rubber Gloves.—**

1. Wash gloves with cold water.
2. Wash with green soap and hot water, rinse thoroughly, and boil for five minutes.
3. Dry, mend, powder, and sort.
4. Sterilize in double covers in which gloves are laid flat and separated by the cover, for half an hour at twelve pounds pressure.

After gloves are mended, sort, roll each pair in gauze (marked), boil for twenty minutes in 4 per cent. sodium bicarbonate solution. Gloves are then taken out, placed on sterile table, and laid upon double thickness of sterile towels, one pair at a time; then outer surfaces are partly dried with towels. Gloves turned by edge of cuff and inner surface, dried, powdered on both sides, rolled in sterile gauze, and folded in double thickness of sterile towels. The nurse, before beginning to take gloves from sterilizer, will scrub, wear gloves, and take all precaution that the process be absolutely sterile throughout.

**Towels, Sheets, Gowns, Etc.—**

1. Remove blood, pus, etc., by soaking in cold water to which may be added a little ammonia.
2. Rinse thoroughly.
3. Launder.
4. On return, mend, fold, wrap in package or bag, pinning snugly. Place in steam sterilizer for half an hour at fifteen pounds pressure; dry for fifteen minutes. New towels, sheets, etc., should be boiled before sterilizing.

**Plain Gauze Pads, Packing, and Dressings.—**

Large square laparotomy sponges, 9 thicknesses, 15 by 15 when finished.

Medium laparotomy, sponges, 9 thicknesses, 15 by 6 when finished.

Small square cut gauze, 9 by 12.

Small long cut gauze, 9 by 22.

Scrub cut gauze, 14 by 18.

Vaginal cut gauze, 7 by 9.

Sponges not sewed are so folded that all raw edges will be held securely inside.

All gauze sponges are sterilized by steam for half an hour at fifteen pounds pressure, and the process repeated at twenty-four-hour intervals for three days.

### STRIPS

**Corrosive Cotton.**—Cut absorbent cotton in two-inch cubes, place in a bag, tie loosely, soak in corrosive sublimate, 1 in 100, for twenty-four hours; dry in a sterilizer, shaking from time to time.

**Tampons.**—Cut lamb's wool in convenient sizes, two by four inches and eight by ten inches. Tie a strong string around the middle of the tampon to facilitate its withdrawal. The ends of this string should be knotted together.

Cut strips of absorbent cotton two inches thick by four inches long. Double these strips and tie with strong thread, the ends to be six inches long and knotted.

### Iodoform Formula.—

Normal salt solution.....	6 ounces
Green soap.....	$\frac{1}{2}$ dram
Carbolic acid, 95 per cent.....	3 drops

Heat the above mixture lukewarm and add two drams of iodoform powder; dissolve and mix thoroughly; then rub well into three yards of gauze which has been previously sterilized for half an hour at fifteen pounds pressure. Before making this gauze, the nurse should scrub up, put on sterile gown, cap, mask, and gloves and have everything used in the process absolutely sterile.

### Dakin's Solution.—

Dry carbonate of soda.....	140 grams
Sterile water.....	10 liters
Chloride of lime.....	200 grams
Shake well and let stand for a half hour. Siphon off the water.	
Then add—	
Boric acid.....	40 grams

This solution should be neutral in reaction and is in proper strength for use. It should be made fresh every three days.



## CHAPTER XV

### THE SURGEON'S HOSPITAL KIT

While better service and greater conveniences are naturally secured in a hospital when surgical work is to be undertaken, yet occasions present themselves when, for one reason or another, it is wholly out of the question to remove the patient to the hospital. In such an event, it becomes necessary to perform the operation in the patient's home, where an operating room must be prepared.

The problem of providing sterile supplies, such as sutures, sponges, gowns, and all other necessary material, has been greatly simplified by the hospital kit. This kit is prepared at the hospital and its contents meet all the requirements of the nurses and surgeon who conduct the operation. The supplies that of necessity must be sterile are sterilized in the hospital and are contained in wrappers or covers which prevent their contamination. The entire kit is sent out with the nurse or it may accompany the surgeon. A fee of from five to ten dollars is customarily charged by the hospital for the preparation and loan of these supplies.

The accompanying illustrations are of what is known as a full, or complete, kit. Its contents are calculated to be sufficient to supply any operative need. A special kit contains only the required supplies for a special or given operation. The only difference is that the amount or number of the individual supplies is less. For example, a full kit will contain four or six large sterile sheets. This number of sheets is not required in an appendectomy; consequently in a kit that has been prepared for an appendectomy there will be but three sheets. This determination of the number of supplies is observed in selecting the entire contents. It is only when the nature of the operation is unknown that the full kit is sent out.

The container of these goods may be of any nature or style. However, a telescope of heavy fiber, as shown in the illustrations, will be found most

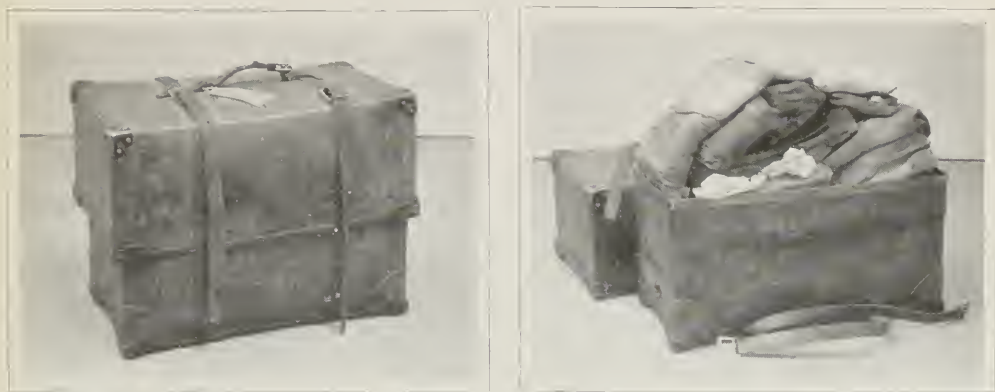


FIG. 127.—THE SURGEON'S HOSPITAL KIT.

The kit is ready to send anywhere, and with its contents an aseptic operation may be performed without fear that the supplies are not sterile.



FIG. 128.—CHEMICALS AND SOLUTIONS CONTAINED IN STERILE KIT.

Iodin-benzin, alcohol, green soap, sterile vaselin, bichlorid tablets, Harrington's solution, carbolic acid, tincture of iodine, oil of cloves, formaldehyd, collodion.

serviceable and convenient and will withstand the hard usage incidental to sending by express or otherwise. The style of the telescope makes it adaptable to the space required by the contents of the various kits. The total weight of a full kit approximates seventy pounds.

#### CONTENTS

The contents of a full kit consist of the following articles, which are firmly and snugly packed in the telescope. Those marked "S" contain sterile supplies. The following list is numbered to correspond with the numbered articles in the engraving (Fig. 129).

1. Sterile granite basins, 4, "S."
2. Packages of catgut, 1 dozen each, "S":
 

0 Plain	1 Chromic
1 Plain	2 Chromic
2 Plain	3 Chromic
3 Plain	4 Chromic
3. Ether, 4 ounces, 5 packages.
3. Chloroform, 4 ounces, 2 packages.
4. Adhesive tapes.
5. Stack of sheets, 6, drapes, "S."
6. Stack of towels, 2 dozen, "S."
7. Alcohol, 70 per cent., 1 pint.
8. Green or liquid soap, 1 pint.
9. Iodin-benzin, 1 in 100, 1 pint.
10. Tincture of iodine, 8 ounces.
11. Bichlorid of mercury tablets, 100.
12. Collodion, 4 ounces.
13. Harrington's solution, 4 ounces.
15. Formaldehyd for preserving specimens.
16. Oil of cloves, 4 ounces.
17. Assortment of rubber drainage tubes.
18. Carbolic acid.
19. Sterile vaselin, 2 ounces.
20. Rubber and glass catheters.
21. Glass irrigating tips, 2.
22. Tube, 1, containing 6 yards iodoform packing.
23. Assorted gauze bandages,  $\frac{1}{2}$  dozen.
24. Gauze dressings, 5 packages; sponges, 8 packages; gauze packing, 5 yards, "S."
25. Walling-off packs, 3 packages, 4 each, "S."
26. Silk, linen, and silkworm-gut sutures.
27. Razor.
28. Surgeon's and nurses' gowns, 4, "S."
29. Salt blocks, "S."
30. Gloves, 6 pairs, "S."
31. Surgeon's suit.
33. Applicators, 6, "S."
34. Packing-off strips, 2 packages, "S."
35. Talcum powder for hands, "S."
36. Extra gloves.
37. Safety pins.

## Articles not shown in engraving:

Scrub brushes, 6; orange sticks.

Anesthetic masks.

Kelly pad, 1.

Rubber syringe bag, 1.



FIG. 129.—CONTENTS OF A FULL KIT.

Unopened packages, showing what is contained in the kit. These supplies are placed unopened upon the supply table and are so opened by the unscrubbed nurse that their contents can be removed without contamination and placed upon the sterile table.

## USE OF THE KIT

Every package and every bottle is properly labeled so that identification is not difficult. The kit is customarily unpacked in the room in which the operation is to be performed. After unstrapping and removing the upper part of the telescope, the contents are arranged upon the table that is to be used for unopened supplies. The rule governing the opening of packages containing sterile goods is to be observed when immediate preparation for the operation is begun.

The kit is returned to the hospital promptly after the operation is com-

pleted. Sheets and towels that have become soiled with blood should be rinsed in cold water to remove the blood stains and wrung out before repacking in the kit. All unused solutions should be returned to their original containers.



FIG. 130.—PACKAGES OF STERILE GOODS, SHOWING HOW THE CONTENTS ARE WRAPPED IN OUTER ENVELOPES OR CONTAINERS OF HEAVY COTTON FLANNEL.

If the operation is one in which pus has been encountered, a note is placed on top of the repacked contents stating that the kit has been used in a pus case. This is for the information of the surgical nursing staff of the hospital and directs their course in the unpacking and making up of a new kit.

## CHAPTER XVI

### THE PLASTER-OF-PARIS SPLINT

Numerous artificial contrivances have been devised to maintain in apposition fractures of long bones and to immobilize injured or diseased joints. Some of these devices have met with a kindly reception while others have been found so cumbersome or so complex mechanically that their value is lost. Frequently a prohibitory cost has rendered a contrivance impracticable for the average case.

While these mechanical contrivances may be found in the larger hospitals and sanitariums, their use is not common in general practice. The nurse called to serve in any case where immobilization of a joint or a bone is indicated will, in the majority of instances, hear the physician or surgeon order a plaster-of-Paris splint for the purpose of providing mechanical support. Very frequently the nurse will be called upon to perform the preliminary details of making and applying such a splint, and it is the object of this article to acquaint her with an accepted method.

There are two grades of plaster-of-Paris on the market. One is the ordinary commercial plaster-of-Paris, the other, a finer grade known as dental plaster. It may be difficult to secure dental plaster in all localities; but if it is obtainable, it is to be preferred for two reasons: its freedom from gritty and foreign substances, and its property of rapid hardening as well as its lessened tendency to crumble. If dental plaster is unobtainable the commercial plaster will serve the purpose with reasonable satisfaction. Its slow hardening may be overcome in some degree by adding salt to the water used in moistening and applying the splint.

The surgical gauze marketed in 100-yard bolts will be found most convenient. The ordinary cartons of five and ten yards cannot be used.





FIG. 131.—SUPPLIES REQUIRED FOR PLASTER CAST.

The following supplies will be required (the numbers which precede in the list refer to the numbered articles shown in Fig. 131):

1. Gauze bandages, assorted, width 3 to  $3\frac{1}{2}$  inches, six or seven.
2. Adhesive plaster, width 2 inches, two or three yards.
3. Flour sifter to remove grit or lumps from plaster.
4. Ordinary tape measure for measuring limb.
5. Pulley for extension.
6. Two granite basins.
7. Bandage scissors.
8. Block and rope for extension.
9. Manila or wrapping paper for pattern, sheet 25 by 48 inches.
10. Jar of water.
11. Absorbent or fracture cotton, one or two rolls.
12. Surgical gauze, 25 yards.
13. Dental plaster, 50 pounds.
14. Spatula or case knife.

**Measurement of the Limb.**—The splint is so made that it fits the limb and may be readily molded to it. To secure such adaptation each splint calls for measurements of the limb to which it is to be applied. The following measurements are necessary to draft a pattern for the splint.

Let us assume that we have a fracture at the middle of the tibia, and the surgeon desires to apply a posterior splint. In order that complete immobilization of the fracture may be secured, the splint must extend from the toes to at least three or four inches above the knee-joint. The measurements to be taken are:

1. The total length of the splint from four inches above the knee to the ball of the foot.

2. Three-fourths the circumference of the thigh, four inches above the knee. This measurement will represent the width of the upper end of the splint.

3. The distance from the upper end of the splint, four inches above the knee, to the middle of the knee-joint.

4. Three-fourths the circumference of the leg at the knee-joint.

5. The distance from the middle of the knee-joint to the greatest circumference of the calf of the leg.

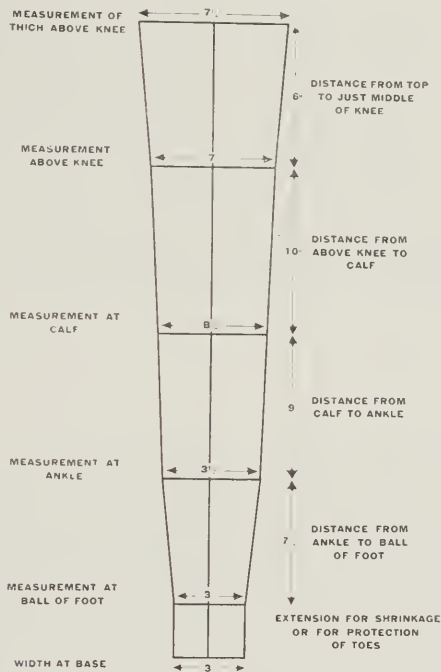


FIG. 132.—PATTERN COMPLETED FOR THE SPLINT.

6. Three-fourths the circumference of the calf of the leg.

7. The distance from the calf of the leg to the ankle-joint.

8. Three-fourths the circumference of the leg at the ankle-joint.

9. The distance from the ankle-joint to the ball of the foot.

10. The width of the ball of the foot. This measurement will represent the width of the lower end of the splint.

It is well to extend the total length of the splint one or two inches to allow for shrinkage and to permit molding over the ends of the toes. If desired, the extra length can be cut off at the time of application.



FIG. 133.—THE NURSE CUTTING TWENTY LAYERS OF GAUZE FOR TWO FORMS.

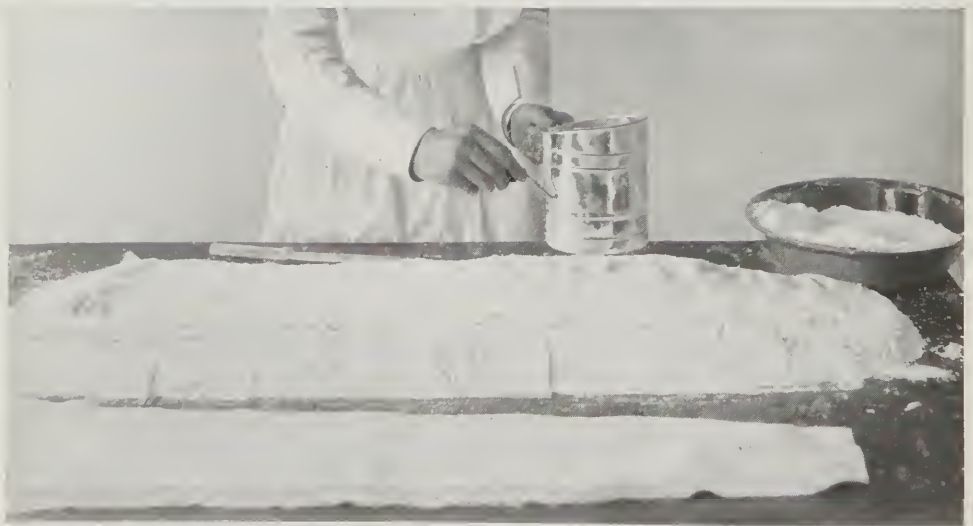


FIG. 134.—SIFTING PLASTER ONTO GAUZE ON PLASTER BED.  
Note cut gauze in foreground.



FIG. 135.—IMPREGNATING GAUZE LAYER BY LAYER WITH PLASTER.

The plaster is worked into the meshes of gauze with spatula or case knife. One form of 10's completed and placed between cardboard at the left.



FIG. 136.—TWO FORMS OF 10'S COMPLETED.

After taking these measurements you will have a record somewhat similar to this:

Total length, 31 inches	Width at calf of leg, $5\frac{1}{2}$ inches
Width at top, 8 inches	From calf of leg to ankle, 9 inches
From top to knee, 5 inches	Width at ankle, 4 inches
Width at knee, 7 inches	From ankle to ball of foot, 8 inches
From knee to calf of leg, 9 inches	Width at ball of foot, $3\frac{1}{2}$ inches

**Making the Pattern.**—Manila or heavy wrapping paper is the most suitable material for the pattern. A piece two feet wide and from three to four feet long will be amply large.

The paper should be spread out upon a smooth surface and a center line drawn a little longer than the required splint. At the upper end of the center line draw a cross line equal to the width of the upper end of the splint. Measure down the center line the length required to reach the knee, and at this point draw another cross line equal to the measurement for the knee-joint. From the intersection of these lines again measure down the center and draw another cross line equal in length to the measurement recorded for the calf of the leg. In a similar manner designate the distance to the ankle and draw a cross line the length of that measurement. The last measurement on the center line is the distance from the ankle to the ball of the foot; at this point draw a cross line equal to the width of the foot at the ball. As previously stated, it is well to make the splint one or two inches longer to provide for shrinkage, and this extra length should be added to the lower end of the pattern. The pattern is then completed by lines connecting the ends of the cross lines. When the drawing is cut out, you have a pattern (Fig. 132) for cutting the gauze for the splint.

**Cutting the Gauze.**—Plaster-of-Paris splints ordinarily consist of from one to three forms of six, eight, ten, or twelve layers of gauze impregnated with dry plaster. The number and thickness of each form is determined by the size and strength desired for the splint. They are spoken of as 6's, 8's, 10's, or 12's. Your instruction from the surgeon may be, "Prepare two forms of 10's." This means that you are to make two forms, each of ten layers of gauze impregnated with plaster.



The surgical gauze is spread out on a smooth surface so as to have its first length extend one or two inches beyond the length of the paper pattern. It is then folded back and forth upon itself to provide the number of layers that may be required for the forms ordered. For illustration,



FIG. 137.—SHAVING THE LIMB PREPARATORY TO APPLICATION OF ADHESIVE PLASTER FOR EXTENSION



FIG. 138.—ATTACHMENT OF ADHESIVE PLASTER WITH BLOCK AND ROPE FOR EXTENSION

suppose that you are to make a splint of two forms of ten layers each. The gauze would then be folded upon itself twenty times. It is well to add a few extra layers so that there will be an ample supply. As each fold of gauze is laid care must be taken that all wrinkles are smoothed out.



The pattern is then pinned over the layers of gauze (Fig. 133) and the gauze cut out.

**Impregnating the Gauze with Plaster.**—A thick bed of plaster, long enough and wide enough for the required splint, is spread evenly upon the



FIG. 139.—PADDING THE LIMB WITH COTTON



FIG. 140.—ENTIRE LIMB COVERED WITH COTTON.

table. A single layer of gauze is laid upon the plaster bed, and plaster-of-Paris sifted over it (Fig. 134) and then worked into it with a spatula or case knife (Fig. 135). Another layer of gauze is laid exactly over the first one and the plaster sifted over and worked into it in a like manner. In

this way the successive layers are built up on top of each other until the required number for the form, 8's, 10's, or 12's, are prepared. The layers which constitute the form are then taken up out of the plaster bed, *en masse*, folded upon themselves two or three times, and laid away between paper or cardboard (Fig. 136). Each form is made in the same manner, folded, and put aside until called for by the surgeon.

The remaining steps of the work are carried out under the personal direction of the surgeon.

**Preparing the Limb.**—The fracture having been reduced, the limb is



FIG. 141.—COTTON PADDING HELD IN PLACE BY GAUZE BANDAGE.

The limb is ready for the application of the cast.

prepared for the splint. If extension is to be applied, the first step is to apply the adhesive plaster for the attachment of the extension weights. When necessary, the hair on the limb is shaved off over a surface equal to the length and width of the adhesive plaster (Fig. 137). The bony prominences over the ankle should be well padded with cotton, and the adhesive applied as illustrated in Fig. 138.

After the adhesive extension straps are in place the entire limb is enveloped in absorbent cotton (Fig. 140) maintained in place by a single layer of a gauze bandage (Fig. 141). Ample padding must be placed under the heel to prevent pressure sores (Fig. 139). A thick cotton pad is also



FIG. 142.—GAUZE FORM IMPREGNATED WITH DRY PLASTER ABOUT TO BE IMMERSSED IN WATER.



FIG. 143.—EXCESS OF WATER BEING WRUNG FROM GAUZE FORM.



FIG. 144.—IMPREGNATING A FORM WITH PLASTER PASTE TO ADD TO ITS STRENGTH.



FIG. 145.—FORM READY TO APPLY TO LIMB.

placed under the knee. The limb is now ready for the application of the plaster splint.



FIG. 146.—APPLYING THE FORM TO LIMB.

The splint is made to conform to contour of limb by molding in place with hand.



FIG. 147.—BANDAGING THE CAST IN PLACE.

**Application of the Splint.**—A thin paste is prepared in one of the basins by mixing plaster-of-Paris with water. A form is immersed in water (Fig. 142) until thoroughly soaked. It is then lifted out, and the excess



of water wrung out (Fig. 143). The wet form is spread out upon a smooth surface, and dry plaster or plaster paste is rubbed into it (Fig. 144) on



FIG. 148.—LIMB IMMOBILIZED IN CAST WITH EXTENSION APPLIED.



FIG. 149.—CUTTING THE BANDAGES THAT HOLD THE LIMB IN THE CAST.

both sides until the meshes of the gauze are full of plaster. This form (Fig. 145) is then applied to the limb. The second, and, if used, a third form is prepared in a similar manner. The plaster-of-Paris paste pre-





FIG. 150.—DRESSING REMOVED TO ALLOW INSPECTION WITHOUT DISTURBING ALIGNMENT OF THE LIMB.



FIG. 151.—PADDING AND SPLINT REMOVED FROM THE LIMB.

The illustration at the left shows the padding used to protect the bony prominences. The figure at the right shows how the splint is molded to the contour of the limb.

viously prepared is used to strengthen any portion of the form that may require reenforcement after it has been applied to the limb (Fig. 146).

If but two forms are used they may be placed together before applying them to the limb.

These forms are so molded to the limb as to conform to its contour and are held in place by means of a gauze bandage (Fig. 147).

An encircling cast of plaster-of-Paris is now but seldom used. In addition to being cumbersome and difficult to remove it does not permit inspection of the limb. A splint permits frequent inspection. All that is required is to cut the encircling gauze bandage (Fig. 149), turn back these cut ends, and the entire limb may be inspected (Fig. 150). The limb may be removed from the splint, repadded, and the splint replaced. This may be done as frequently as desired without the necessity of making a new splint. As the muscles atrophy from disuse and the limb becomes more movable within the splint, it may be firmly fixed again by the addition of cotton padding to its inner surface.

Such a splint is very convenient if a fracture is complicated by an open wound that requires daily dressing or treatment.

If an anterior splint is required it is made in the same manner as is the posterior splint. The steps of application are also identical.

#### POINTS TO BE OBSERVED

Use an abundance of plaster and work it thoroughly into all the meshes of the gauze.

Do not apply the forms while they are very wet. Wring out the water and then rub in dry plaster or plaster paste to give greater strength.

If dental plaster is used one must work rapidly or the forms will set before they are applied.

Pad all bony prominences heavily to prevent pressure sores.

Do not move the limb for at least an hour after the splint has been applied. Allow it to harden through its entire thickness.

Plaster work is "mussy." The floor and bedding should be protected by newspapers.

## CHAPTER XVII

### CATHETERIZATION

Catheterizing the bladder must always be considered a sterile procedure, and, as such, aseptic precautions must be observed whenever it is performed. The bladder is peculiarly susceptible to infection, and the use of an unsterile catheter would probably be followed by cystitis. Such a cystitis will, in almost every instance, be a most distressing condition, characterized by pain, ardor urinæ, frequent micturition, and elevated temperature, with the possibility of an ascending infection of the ureter and kidney as a dire complication.

In view of these possibilities, the warning cannot be uttered too frequently to thoroughly impress nurses with the dangers that may attend the use of an unsterile catheter. The emergency does not exist when the use of an unsterile catheter is in the least justified. The technique of sterilizing a catheter and performing catheterization is so simple and the time consumed in making the sterile preparations so small that neglecting to do so merits nothing but severe condemnation and the immediate dismissal of a nurse.

Catheterization may be divided into the following distinct steps.

**Sterilization of the Catheter.**—The catheter or catheters are rendered sterile by boiling over a stove, hot-plate, or alcohol burner for a period of not less than ten minutes. It is always well to prepare at least two or three catheters to provide against the possibility of one becoming contaminated or its lumen obstructed.

A good selection is one glass and two rubber catheters. Sterile cotton will be required, and this may be provided by boiling several balls of absorbent cotton at the same time the catheters are boiled. Rubber gloves are desirable and, if used, they also may be boiled at the same time. In addition, sterile oil will be required for lubricating the catheter; ordinary olive. or sweet, oil is found to be very satisfactory. Its steriliza-

tion may be accomplished by boiling it in its container in a basin of water. Alcohol, 70 per cent., or bichlorid, 1 in 1000, and a basin to receive the urine that is withdrawn complete the equipment.

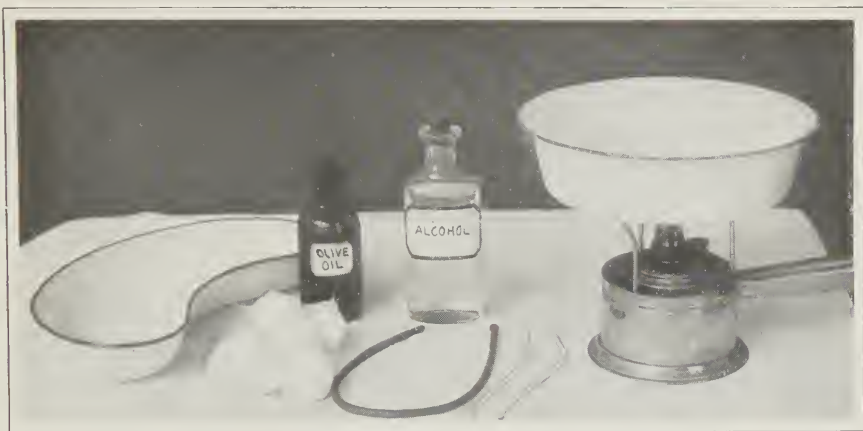


FIG. 152.—THE EQUIPMENT FOR CATHETERIZATION.

Sterile olive oil, 70 per cent. alcohol, basin for boiling, rubber and glass catheters, cotton swabs, and receptacle for urine.

**Sterilization of the Hands.**—The hands should be thoroughly scrubbed and immersed in alcohol or bichlorid. Rubber gloves that are sterile add to the security of the procedure.

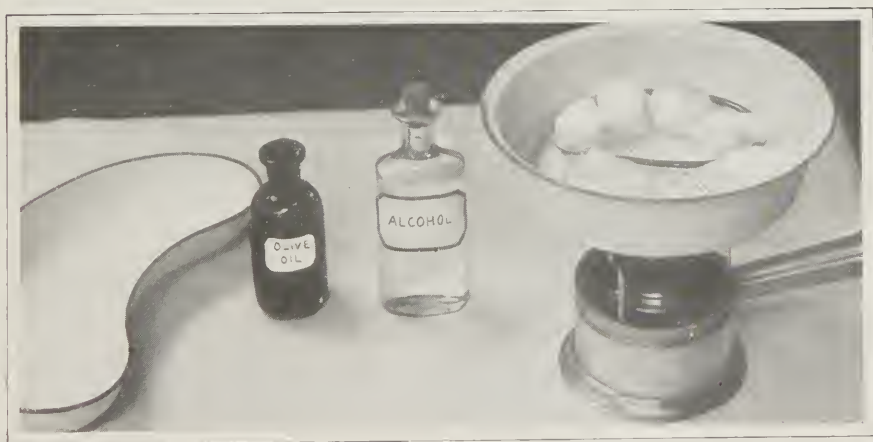


FIG. 153.—STERILIZING CATHETERS AND COTTON BALLS.

If desired, the rubber gloves may be boiled at the same time.

**Catheterization.**—The bladder should be catheterized under direct inspection. To attempt to do so under cover is impossible without the contamination of the catheter. The patient is draped as for a vaginal

examination, and is requested to separate the limbs a reasonable distance. If desired, she may flex the knees.

With the left hand the nurse separates the labia to expose the urethral meatus. The orifice of the meatus is wiped with pieces of sterile cotton and local secretions thoroughly removed. With a fresh piece of cotton moistened in alcohol or bichlorid the meatus is again cleansed.

The catheter is then taken from the basin in which it was boiled. In doing so, never touch the end or nearer than three inches to the end that is to be inserted. The catheter is dipped into the sterile oil, and the excess



FIG. 154.—THE NURSE IS REMOVING STERILIZED CATHETER.

oil permitted to drip off. The catheter is then inserted into the meatus, and by gentle, steady pressure its entrance into the bladder is accomplished. When the catheter enters the bladder, the urine will flow into the basin previously placed to receive it.

The bladder emptied, the rubber catheter is pinched sufficiently to close its lumen and withdrawn. If a glass catheter is used, cover the end while withdrawing it.

Some surgeons direct that after each catheterization, before the catheter is withdrawn, one or two drams of a 2 per cent. solution of argyrol be injected into the bladder and permitted to remain. If such are the instructions, the argyrol may be injected through the catheter by means of a record syringe or poured into a small funnel attached to the end of the catheter.

## COMMENTS

1. The hand used to spread open the labia is not removed during the entire procedure. The labia are held retracted during the process of catheterization. It will be necessary, therefore, to have every article that is required within easy reach.

2. Do not entirely empty, at one catheterization, a bladder that is markedly overdistended, or in which there has been a prolonged retention. Remove only about half the contents at the first catheterization.

3. Constant dribbling of urine or frequent desire to urinate, with the passing of only a small quantity, should excite suspicion and an examination should be made to determine whether the condition is not one of overflow of a distended bladder incapable of emptying itself.

4. Catheterization should be resorted to as infrequently as possible. It should not be made a procedure of convenience. Exhaust every other method of causing a bladder to empty itself before catheterizing. Catheterize only when such procedure is positively indicated.



## CHAPTER XVIII

### OPERATION FOR APPENDICITIS

#### DUTIES OF THE NURSE IN PREPARATION AND DURING THE POST-OPERATIVE PERIOD

In the foregoing chapters I have discussed the essentials that a nurse should know when assisting in operative work. For the purpose of correlating that information as well as to reveal its practical application I am devoting this chapter to a description of the duties of a nurse while engaged in a given operation.

In the preparation of this chapter I have borne in mind that it will be read by two classes of readers—the graduate and the undergraduate or pupil nurse. To one, many of the details will be familiar, while to the other, in the most part, this chapter will give new light and information. By reason of this it is necessary that minor details, which to some will appear extremely rudimentary, be touched upon.

#### NATURE OF THE DISEASE

In order that a nurse may be able to care intelligently for a patient suffering from appendicitis it is requisite that she be informed as to its nature, symptoms, and course. Such knowledge will enable her to follow her patient through his illness and detect at their very onset unfavorable symptoms or complications. The nurse should be in possession of the nature and course of the condition of every patient for whom she assumes the responsibility of being the attending nurse.

**Definition.**—Appendicitis is an acute, subacute, or chronic inflammation of the vermiform appendix producing local and constitutional symptoms of definite character.

**Cause.**—Many factors may unite to produce it. The foremost are constipation and digestive disturbances, bacterial infections producing acute inflammation, foreign bodies, principally fecal concretions, catarrhal infections causing a thickening of the mucous lining of the appendix and thereby occluding its lumen and altering its blood supply, malformations, adhesions, and, rarely, trauma.

## SYMPTOMS OF ACUTE ATTACK

**Pain.**—At first general throughout the abdomen and often mistaken for intestinal colic and indigestion. This pain will localize in from four to twenty-four hours and be of greatest intensity in the right iliac fossa over what is called McBurney's point. The patient often secures relief by lying on his right side with his knees drawn up.

**Nausea.**—Nausea or vomiting will follow the pain either with its onset or within a few hours. In true appendicitis the pain is first, then nausea or vomiting, and *not* nausea or vomiting and then pain. The nausea may be of but slight degree and consist only of a sick feeling, and again there may be continuous vomiting and retching, severely aggravated by the taking of water or nourishment and the administration of medicines or cathartics.

**Tenderness.**—The tenderness on pressure may at first be general through the entire abdomen but becomes localized in the right iliac fossa in from two to twenty-four hours. Light pressure over McBurney's point with the finger tips, will intensify the pain.

**Muscular Rigidity.**—On palpation the muscles will be found rigid and frequently very boardlike with a prominence of the right rectus; the muscles of the abdomen may also be retracted causing a scaphoid abdomen. Again, they may only be rigid on palpation; their rigidity depends much upon the severity of the attack and nervous sensibility.

**Temperature and Pulse.**—These are not infallible in making a diagnosis. They may be absolutely normal during the early hours or days of the attack. Again at the very onset we may obtain a pulse ranging from 90 to 120 with a normal temperature or one that registers  $100^{\circ}$  to  $103^{\circ}$  or  $104^{\circ}$ . When the pulse and temperature are just cause for alarm the local condition in and around the appendix has usually advanced to a grave state. Again, one may find a normal pulse and temperature with a gangrenous appendix and their normal state be not altered until a spreading peritonitis ensues.

**Prostration.**—This may be marked or not. One patient may be desperately ill while another with an appendix equally bad may have but little prostration and not appear very ill.

## COMPLICATIONS

Appendicitis is a most treacherous disease and may terminate in the following ways: Convalescence uneventful; the formation of a localized abscess; gangrene, sloughing, and perforation of the appendix; rupture of the appendix or a formed abscess into the free abdominal cavity; peritonitis, and intestinal obstruction. These complications may be entirely prevented if the disease is recognized in its earliest hours and the only now recognized treatment, the removal of the appendix by operation, be promptly resorted to. There never was and never will be a purely medical method of treatment in which safety may be secured. Cases, we admit, do recover under medical treatment, but there often follows a long invalidism characterized by digestive disturbances, pain, nausea, constipation, and later gall-bladder involvement. It must also be remembered that every death from appendicitis might have been prevented if the diseased organ had been promptly removed; not as a last resort or after the patient's condition had become serious, but early, in the *first twelve hours of the disease*.

## OPERATIVE TREATMENT

There is no medical treatment. Safety lies in early and prompt removal. There is greater risk involved in not operating than in an operation done by a competent and experienced surgeon. He who attempts to treat appendicitis by medicinal measures or any measures other than surgical is assuming a heavy responsibility. The patient will eventually pay a severe penalty either by the bringing on of complications or a life of digestive disturbances, gall-bladder infection, debility, renal disease and much suffering, distress, and invalidism.

## NURSING CARE: PREOPERATIVE

What is the duty of a nurse upon arriving at the home of a patient who in two or three hours is to undergo an operation for acute appendicitis?

**The Patient.**—The nurse will undoubtedly be ushered into a home where the members of the family and immediate neighbors are in a greater or less stage of excitement by reason of the impending operation. The exercising of a little tact and a rapid sizing up of the situation will enable

the nurse to counteract this disordered state of affairs. Nothing will bring about order and quiet more rapidly than by asking everyone, except possibly one or two close relatives, to leave the sickroom and to assign to certain members of the family the performance of work in assisting to prepare for the operation. A word here and there of encouragement and assurance will soon create a feeling of confidence and quietude.

The patient, suffering more or less, depending upon whether he has had an opiate or not, should be told that certain things must be made ready and that his coöperation and compliance with orders will increase the success of the operation. After taking his temperature and pulse and recording it, he should be given a cleansing bath. While giving the bath the patient's confidence and repose may be more firmly secured if the nurse will explain to him in more or less detail just what he may expect and the experiences which he is to undergo. An operation, no matter how small or great, is always a more or less formidable undertaking to any person, and it is no more than right that groundless fears and suspicions be caused to vanish by a calm and plain statement of facts. This conversation should not be characterized by boasting tales of operative work or revolting experiences or gossip; to reiterate, it should be a calm, sensible statement of uncolored facts.

The bath completed, the abdomen is to be shaved. As a rule no enemias are given unless by special order from the surgeon; the patient is not catheterized if he is able to void urine. By reason of the irritability of the stomach, common in this disease, nothing is to be given by mouth; he may, however, be permitted to frequently rinse his mouth. This done, a clean gown is put on and the bed is made up with clean linen. The patient is now urged to lie as quietly and comfortably as possible while the nurse directs her attention toward the preparation of the room in which the operation is to be performed.

**The Room.**—Before giving the patient his bath the nurse will have instructed, as suggested above, certain members of the family to remove the furniture, wall decorations, curtains, and rugs from the operating room. Newspapers are now spread over the floor and over these there is spread a large sheet, tacked to the floor at its corners and at one or

two places along the edge. The lower sashes of the windows are covered with sheets or newspapers and light permitted to enter through the upper sashes alone. The dining table and two or three smaller tables and chairs are carried in and arranged as suggested on page 23. The room may then be considered as ready in so far as the floor, furniture, and light are concerned; nothing more can be done to it until the "kit" of sterile goods and instruments arrive.

**Water.**—Several gallons—five—of water should be put on to boil and two or three gallons of sterile cool water are to be provided. Several hand basins may well be sterilized by boiling in a wash boiler. Unless one has two or three hot-water bottles several fruit cans should be made ready to serve instead of hot-water bottles when needed.

By the time the foregoing has been accomplished the "kit" and surgeon's nurse will have arrived. It is now that the preparation becomes more active.

**Unpacking the Kit and "Setting-up."**—The supplies that are contained in the kit are to be unpacked and arranged in orderly piles upon a supply table that is out of the way, but within easy access. While this is being done the surgical nurse will be scrubbing up, and donning sterile gown and gloves. The instruments are put on to boil.

The unscrubbed nurse opens, in the proper way, the packages of sterile goods and hands their contents to the clean nurse. The first package to be opened is that which contains sterile draping sheets in order that all the tables may be covered with sterile covers and so protect the supplies that are to be arranged upon them. One after another the several packages are opened and their contents handed to the clean nurse who suitably arranges them. One or two floor basins are arranged for the receiving of soiled dressings and for fluids. The instruments are brought in and given to the clean nurse who dries them with a sterile towel and arranges them in an orderly manner upon the instrument table. The surgeons have now arrived and they should be provided with brushes, soap, and plenty of water for scrubbing up. The unscrubbed nurse assists them in putting on their headgears and face masks and assures herself that they are provided with plenty of scrub water and that the hand



basins contain their proper solutions for the final cleansing of the operator's hands. She then returns to her patient and remains with him until he is carried to the table. It is possible that, unless he has had one, the surgeon will order that the patient receive a hypodermic of morphin and atropin. This given, the stockings are put on and his head covered with a towel or cap. The temperature and pulse are again taken and recorded.

#### OPERATION

Under the direction of the nurse the patient is carried to the operating table by two of the members of the family or neighbors. With the commencement of the administration of the anesthetic the unclean nurse uncovers the abdomen and surrounds it with sterile towels. She next performs the first step of preparing the operative field by thoroughly cleansing it with a solution of benzin with iodin—1 part of crystals of iodin to 1000 parts of benzin. When this has been permitted to evaporate the clean nurse will paint the entire abdomen with tincture of iodin—50 per cent. solution in alcohol—and drape the field with sterile towels and sheets. The unscrubbed nurse's immediate duties with the patient are over for the present and she holds herself in readiness to perform the following tasks:

##### **Duty of the Unscrubbed Nurse during Operation.—**

1. To see that the house is quiet and no disturbing noises exist.
2. To be in readiness to hand the clean nurse additional supplies, dressings, or solutions.
3. To assist the anesthetist as she may be requested.
4. To keep watch of and count all soiled dressings or materials falling or thrown upon the floor.
5. To observe the clean nurse's count of sponges and instruments when the surgeon is about to close the wound.
6. To prepare the patient's bed and fill two or three hot-water bottles.
7. To assist the clean nurse in applying the abdominal binder.
8. To superintend the patient's return to bed.

**Duty of the Scrubbed or Clean Nurse during Operation.—**The technique of aseptic surgery as taught to the nurse during her training is to be



carefully observed and rigidly carried out. In operations performed in private homes greater vigilance and precautions are to be exercised than in a hospital on account of the increased danger of contact with non-sterile articles and objects. The clean nurse must be constantly on the alert and watch her every movement and exercise double precautionary care to prevent contamination.

Having donned her headpiece and face mask she scrubs up with soap and sterile water and lastly submits her hands and forearms to a thorough immersion in 70 per cent. alcohol. A sterile gown is then handed to her by the unscrubbed nurse who opens its outer container so that the clean nurse can take the clean gown from it without coming in contact with this outer protecting cover. The gown is fastened in the back by the unscrubbed nurse. Rubber gloves are then put on. It is an excellent safeguard for the clean nurse to put on two pairs of rubber gloves, one over the other. The outer pair is taken off when the patient's table preparation is complete. By so doing the second pair of gloves that are worn during the actual operative work do not come in contact with anything previous to the handling of dressings, sponges, sutures, and instruments. It is certainly a commendable precaution and an excellent step in surgical technique.

Thus robed, the clean nurse arranges the dressings, sponges, sutures, and instruments upon the instrument and dressing tables as they are handed to her by the unscrubbed nurse—never trust to memory, always write down the number. After having these supplies and instruments arranged in accessible order, the needles that are to be used are threaded with their suture material—catgut, Nos. 2, 3, and 4, silkworm gut, and linen. Extra catgut sutures and ligatures are immersed in a basin containing 70 per cent. alcohol.

When the patient is placed upon the table and the abdomen has been uncovered and scrubbed with the iodine-benzin solution—1 in 1000—and draped with the sterile towels by the unscrubbed nurse, the clean nurse paints the entire abdomen with a 50 per cent. tincture of iodine in alcohol by means of a gauze sponge held by a sponge-holder. The chest and limbs are covered with sterile sheets and the operative field surrounded

with sterile towels maintained in place by means of safety pins or towel clips. The patient has now been properly draped and everything is in readiness for the surgeon to commence his operative work. If the nurse has worn, up to this time, two pairs of rubber gloves, it is now that she discards the outer pair and passes her other pair of gloves through a solution of alcohol. •The operative work commenced, the clean nurse's duties consist of supplying the surgeon and his assistants with clean sponges, holding retractors when so requested, to see that all exposed intestines are kept covered with hot, moist saline squares, to hand to the surgeon the sutures, ligatures, and needles called for and the various instruments that are used. She should also see that the surrounding field is kept clean by the placing of sterile towels whenever those that are in place become badly soiled. No definite or consecutive steps of duty can be described. There is only one rule to follow and observe—to aid in every possible way to expedite the surgeon's work by anticipating his wants and having ready for him that which he may require without his having to ask or wait for it. One's ability to do this stamps one as an excellent or only a mediocre surgical nurse; intense concentration and watchfulness alone bring to the nurse this perfection and ability.

The appendix removed, the stump inverted and covered over, the coil of intestine returned to the abdomen, and the surgeon about ready to close the wound should find the nurse prepared to inform the surgeon that everything has been accounted for. She hands him a curved needle with No. 1 or No. 2 catgut, in a holder, for closing the peritoneum. Next she has ready six large curved needles threaded with silkworm gut for tension sutures; thereafter the surgeon is supplied with small curved needles threaded with No. 3 catgut for closing the muscles and fascia; lastly, he is given a skin needle threaded with No. 3 catgut for closing the skin.

The wound sutured in its entirety, a moist saline sponge is used to cleanse the skin; the wound is covered with the customary dressing maintained in place by adhesive plasters; a pad and abdominal binder put on with the aid of the unscrubbed nurse terminates the necessity of the clean nurse keeping herself sterile.

The patient returned to bed, the clean nurse as rapidly as possible

cleans up and while doing so devotes her attention to the performance of the following duties:

1. Boils and dries the instruments and returns them to the surgeon's bag.
2. Empties out all solutions and dries their containers.
3. Packs up all returnable supplies and places them in the "kit."
4. Wraps soiled sponges and dressings in a paper ready to be burned in a stove or furnace.
5. Gives the removed appendix, in a solution of alcohol or formalin, to the nurse remaining upon the case.
6. Secures the assistance of members of the family or neighbors to set the room in order and arrange the furniture and drapes as they were before the operation.

The duties of the clean nurse are now completed.

#### POST-OPERATIVE CARE

Upon his return to bed the patient is immediately surrounded with two or three hot-water bottles—care being exercised to so place them as to prevent causing burns—and covered with a light warm sheet, blanket, and spread. Do not load on extra blankets. The patient's head is turned slightly to one side and if required his jaw is supported to afford him unimpeded respiration. No pillow is to be used except in patients past forty with spinal curvature. The pulse is taken every ten minutes and its rate and character recorded upon the chart. As consciousness returns there may occur some vomiting or retching; the mouth is to be kept clean of all such vomitus and mucus. Any restlessness or tendency to toss about must be prevented. When the patient is far enough out of the anesthetic to understand, he should be informed that the operation is over, that he is back in bed, and with a few reassuring words be requested to remain quiet and rest. The room is darkened, visitors are forbidden, and the immediate relatives are admitted only for a few moments. Absolute quiet should be insisted upon so that the patient may be benefited by a few hours sleep and rest. An ample amount of fresh air must be maintained.

## WHAT TO WATCH FOR

**Shock.**—If occurring either early or delayed, shock should receive prompt and energetic treatment, and in the event of its prolongation or increasing severity and nonresponse to preliminary treatment the surgeon or attending physician must be promptly notified. The preliminary treatment and the precautionary orders commonly given are: morphin, grain  $\frac{1}{4}$ , atropin, grain  $\frac{1}{150}$ , hypodermatically; strychnin, grain  $\frac{1}{40}$ , or camphorated oil; saline enema; local heat and elevation of the foot of the bed. If the patient's condition under this treatment does not promptly improve the surgeon must be notified.

**The Wound.**—The wound must be protected and the patient prevented from displacing the dressings. The dressings should be inspected frequently to ascertain that they are properly maintained. The patient will undoubtedly complain of the pain or smarting in the wound and his comfort may be enhanced if the nurse will but tell him that such sensations are but a natural sequence of the operation and are to be expected; that these sensations will disappear in a few hours and that he must not permit them to cause him any worry. At times and in some individuals the wound is extremely painful and in this event, if the above encouragement does not allay his restlessness, it is justifiable to administer a small dose of morphin. Pain in the wound may also be relieved by placing a pillow under the patient's knees, thus relieving and relaxing the tension of the abdominal muscles.

## COMPLICATIONS

Barring a little nausea, pain, and distress, the patient should experience an uneventful recovery. However, complications can and may ensue and in that event the nurse should be prompt in the detection of their early warning symptoms and thus secure prompt treatment by reporting them to the surgeon as early as they are detected.

**Vomiting.**—In an emergency appendectomy the opportunity is not afforded for the usual surgical preparation and the intestinal tract and often the stomach are not in as satisfactory a state as we ordinarily desire them to be. Added to that condition, the administration of an anesthetic

may cause rather severe post-operative vomiting and nausea. This usually subsides in twenty-four hours. In the event that it persists longer than this several conditions must be suspected: acute dilatation of the stomach, intestinal obstruction, and peritonitis. The treatment of vomiting should, during the first twenty-four hours, consist of rest and withholding of nourishment. Sometimes by causing the patient to drink one or two glasses of water in succession his vomiting will cleanse the stomach of its irritating contents and thus cause the vomiting to cease. If the vomiting continues longer than twenty-four hours it should not be ignored and the surgeon will undoubtedly order a gastric lavage. In case a dilatation exists the lavage will be repeated frequently. Acute dilatation is characterized by continuous or frequent vomiting, distention, rapid pulse, and gradual but appreciable failure of strength.

Persistent vomiting also occurs with obstruction and in general peritonitis, the symptoms of which are characteristic; the nurse should be familiar with their nature and mode of onset.

To summarize: If vomiting persists longer than twenty-four hours one should be on the alert to discover the exact exciting factor and direct toward it the proper treatment.

**Distention and Gas Pains.**—The exposure of the abdominal contents to the external air, the handling of the intestines during abdominal operations, and the intestines being more or less loaded with only partially digested foodstuffs, together with the effect of the operative procedure upon the nervous system serve to cause what are commonly called gas pains and distention of greater or less degree. Simple gas pains of but transitory duration are unworthy of much consideration as they cause but a few hours distress and are readily relieved. However, when they persist and continue beyond the first or second day and have added thereto marked abdominal distention they then merit active treatment. Their nature is such as to cause nagging and frequently recurring cramps which give much annoyance and an uncomfortable, full feeling and thereby cause a more labored respiration with a rapid pulse of 100 to 110 or 120. The treatment is to stimulate the arrested peristalsis by means of enemata, and if necessary a dose of castor oil or a saline cathartic. Persistent



distention may be present in the early stages of peritonitis and it is essential that one differentiate between peritonitis, acute gastric dilatation, and obstruction, and also intestinal paresis or arrested peristalsis.

**Temperature.**—After twelve hours the temperature rises to  $99^{\circ}$  or  $100^{\circ}$ . At the end of twenty-four hours it may be  $100.5^{\circ}$  and on the second or third day may reach  $100^{\circ}$  to  $101^{\circ}$ . When three or four days elapse it will have reached a normal stage with only a slight afternoon elevation. Such a range of temperature is but a normal post-operative rise and is sometimes called a surgical fever. When the temperature persists longer than three days or rises to a higher mark, or, when there is a morning drop and an evening elevation to  $101^{\circ}$  or  $102^{\circ}$ , one must conclude that an unnatural factor is present and is causing this fever. The foremost factors are: Wound infection, intestinal toxemia, or a lung complication. A temperature existing after the third day and which reaches  $101^{\circ}$  or higher should be immediately reported. A chill followed by a rise in temperature to  $101^{\circ}$  or  $104^{\circ}$  denotes an infection and demands that the wound be early inspected by the surgeon. A persistent subnormal temperature with a pulse of 100 to 110, small in character, should also be promptly reported. A temperature persisting longer than three days is as a rule an abnormal condition and demands a search for its cause.

**Kidney Secretion.**—The effect of the administration of an anesthetic plus the restriction of water by mouth has a tendency to reduce the amount of urine secreted during the first forty-eight hours to from eighteen to twenty-five ounces per day. In some instances where there is a kidney involvement or from the anesthetic the after-effects of the operation may cause an acute hyperemia of the kidney and also an acute nephritis with the consequent suppression of urine to only three or four ounces per day. If this condition is permitted to exist undetected uremic poisoning will ensue. Consequently it is very essential that the amount of urine secreted post-operatively should be carefully measured and the total twenty-four-hour secretion be charted. At the earliest intimation that the kidney function is partly suppressed this fact should be drawn to the surgeon's attention. A total amount of urine of less than ten ounces the second day must not be ignored. Again the effect of the operation, the



anesthetic, and the confinement in bed may cause the patient to be unable to void the urine and be the cause for bladder retention. The first step to be taken in all instances of suppression is to first catheterize the bladder so as to be certain that it is not a case of retention in place of suppression. It has undoubtedly been impressed upon you in your training that the bladder may be fully distended and the patient only be able to void a few ounces voluntarily. A catheter will frequently clear up these cases and reveal retention and not suppression of urine.

#### POST-OPERATIVE NURSING

The nurse's chart should reveal an intelligent record of the exact condition of the patient during the period of his convalescence. The pulse must be taken and its rate recorded frequently with a word or two in explanation of its character during the first twenty-four hours. The temperature and rate of respirations are to be taken every three hours—oftener if conditions warrant—and intelligently recorded. Soon after regaining consciousness the patient will complain of dryness in the mouth and ask for water. As a rule, it will be best to refuse to give him a drink. The patient should be assured that if he will try and sleep for an hour or two he will then be permitted to quench his thirst. Unless she is in possession of orders to the contrary, water may be administered in one or two hours after the operation. The quantity is gradually increased as the tolerance of the stomach warrants. Under no condition should any nourishment be given until it is ordered by the surgeon—this injunction should hold true in all operations upon the stomach or intestines. During the first twenty-four or forty-eight hours all medication required is administered by means of hypodermic injections. By the second day the nurse will customarily be ordered to give the patient liquid nourishment and this will be gradually increased to soft and to light diet before the end of a week.

For the relief of gas pains and for the securing of bowel movement after the second or third day an enema of salts and glycerin will be ordered. Gas pains may be relieved during the first few days by the insertion of a rectal tube, altering the position of the patient, and the giving of hot drinks.

Frequent alcohol rubs will do much to overcome the backache and muscle pains; these will also have a tendency to rest the patient and thereby cause him to fall asleep.

As a rule, when two days have elapsed the patient will be in a fairly comfortable condition and he will require only general care. He will be permitted to sit up with a back rest on the fourth or fifth day and in a chair at the expiration of a week or at the latest ten days.

In the event that the condition of the appendix was such as to require the employment of drainage the nurse will then have added duties to perform. It will be expected that she keep careful watch of the dressings and when they become badly soiled change them, if so ordered. When changing dressings it is well to observe the nature and estimate the amount of the discharge and to chart these findings. These dressings will be required two or three times during the first twenty-four hours and twice a day thereafter. The drainage most frequently used is a perforated or split rubber tube surrounded with packing gauze. The packing gauze is customarily removed as soon as it loosens, usually in four or five days; the tube is maintained until the discharge lessens and becomes more serous in character; after that a little gauze or rubber dam is used to drain the wound which heals by granulations in from two to six weeks.

In all cases in which drainage has been employed the nurse must be conscious of the possibility of delayed hemorrhage by reason of sloughing blood vessels or by pressure necrosis of the rubber tube, thus causing a vessel to rupture. This complication may occur anywhere from the fourth to the twenty-first day or as long as the tube is in place. The hemorrhage may only be slight or very severe, depending upon the vessel that has ruptured. When marked and active the patient cannot always be permitted to await the arrival of the surgeon to attend to controlling the bleeding, for he is in danger of becoming exsanguinated. In the event then of an active secondary hemorrhage from the wound, the nurse must seek to control it. This is best done by firmly packing the wound with gauze and covering this with a pad held in place by a firm binder. When the patient loses considerable blood before the hemorrhage is controlled and demonstrates the effect by his general condition it is good treatment

to administer a small dose of morphin; elevate the foot of the bed; give a rectal or subcutaneous normal saline. If necessary, heart stimulants may be administered but one must necessarily be careful and avoid overstimulation. The surgeon will advise further treatment.

The nursing details cannot be definitely outlined in each case. It devolves upon the nurse to observe general principles and adapt them to her individual patient. The minor details that are observed all tend to add to the comfort of the patient and their sum total relieves him of much discomfort and annoyance as well as mental worry. Your familiarity with the course and progress of post-operative cases and the observance of the principles of surgical nursing added to the work of the surgeon are the essential factors that will lower the operative mortality. By the conscientious performance of your duty and the exercising of similar judgment and work on the part of the surgeon we will be permitted to say to the public that with the means now at their disposal every death from appendicitis may be prevented. Its mortality rate should be *nil*; if it is not, then someone has erred—either the patient by failing to consult a surgeon promptly, or refusing operation; the surgeon in failing to operate in the early stages; or the nurse in committing an error in nursing care and technique. You will be freed from all blame if you are familiar with and observe the duties of the nurse in every minute detail. To demonstrate to you the general trend of these duties has been the object of this chapter; may it stimulate you to secure a fuller knowledge of your duties as a nurse in caring for a patient submitting to an operation for the removal of the appendix vermiformis, or for any operation to which you may be called to serve in a professional capacity.

CHAPTER XIX  
HOSPITAL METHODS  
SURGEON'S FACE MASK

Many surgeons prefer a face mask that covers the entire face (except the eyes) and head. The nose is safeguarded by such a mask, and no nurse need give any thought or time to removing the perspiration from the surgeon's face during the operation.



FIG. 155.—SURGEON'S FACE MASK.

The pattern here given is for a mask of medium size. It is easy to cut the mask larger if too small to be comfortable. The width of the mask (from B to B) is twenty-five and one-half inches. The extreme height is

twelve and one-half inches. All other measurements are given on the pattern.

Make of two thicknesses of cloth. To cut, fold the pattern and cloth up and down through the center; when folded it will be seen that the two sides are exactly the same. Place the lower edge of the pattern straight with a thread of the goods. This will bring the back edges of the mask on the bias. Sew the top of the mask in a seam from A to B, turn in the edges



FIG. 156.—PATTERN FOR FACE MASK.

of the space for the eyes, and stitch around the space indicated by A-C-A. Hem the back of the mask on both sides from B to D. Then complete by making a half-inch hem across the entire bottom (D to D) for a draw string. Insert the draw string and gather the mask slightly under the chin, fastening the gathers to the draw string. When the string is tied at the back of the neck the mask will fit closely under the chin and around the neck.

## THE MORNING BATH



FIG. 157.—READY TO BEGIN THE BATH, SHOWING THE ARTICLES REQUIRED.



FIG. 158.—REMOVE THE SPREAD, COVER THE BED WITH A BATH BLANKET, AND REMOVE THE COVERS FROM UNDERNEATH.





FIG. 159.—REMOVE THE UPPER SHEET FROM UNDERNEATH THE BATH BLANKET.



FIG. 160.—REMOVE THE PILLOW.



FIG. 161 —UNTIE THE NIGHTGOWN.



FIG. 162.—PLACE THE BATH BLANKET UNDER THE PATIENT.



FIG. 163.—PLACE A BATH TOWEL UNDER THE HEAD.



FIG. 164.—PLACE A BATH TOWEL OVER THE CHEST BEFORE WASHING THE FACE.



FIG. 165.—WASH THE FACE.



FIG. 166.—CLEANSE THE TEETH.



FIG. 167.—EXPOSE THE ARM.



FIG. 168.—WASH THE ARM, AFTER PLACING A BATH TOWEL UNDERNEATH.



FIG. 169.—WASH THE HAND.



FIG. 170.—MANICURE THE NAILS.



FIG. 171.—BATHE THE CHEST. NOTE PROTECTION OF BEDDING WITH BATH TOWEL.



FIG. 172.—TURN THE PATIENT ON HIS SIDE AND BATHE THE BACK.





FIG. 173.—BATHE THE ABDOMEN.



FIG. 174.—PLACE A BATH TOWEL UNDER THE LEG.



FIG. 175.—BATHE THE LEG.



FIG. 176.—PLACE A RUBBER SHEET AND BATH TOWEL UNDER THE FEET.



FIG. 177.—PROTECT THE EDGE OF THE TUB WITH A TOWEL.



FIG. 178.—BATHE THE FEET.



FIG. 179.—REMOVE THE FEET FROM THE TUB.



FIG. 180.—WRAP THE FEET IN A BATH TOWEL  
AND REMOVE THE TUB.

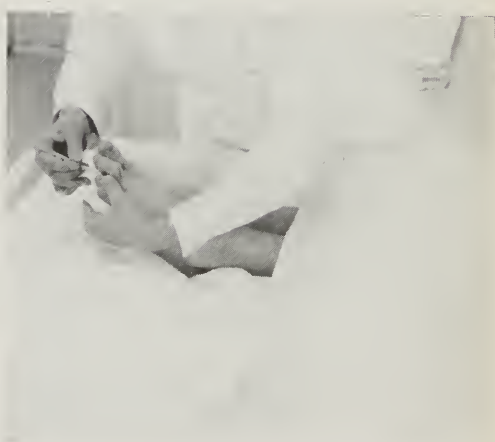


FIG. 181.—CLEANSE THE TOE NAILS.



FIGS. 182 AND 183.—REMOVE THE TOWEL AND RUBBER SHEET, AFTER WHICH THE PATIENT IS COVERED WITH A DRY BLANKET AND THE BED MADE.

### BEDMAKING



FIG. 184.—GRASP THE BATH BLANKET UNDERNEATH THE DRY BLANKET WHICH WAS THROWN OVER THE PATIENT AT THE CONCLUSION OF THE BATH.



FIG. 185.—REMOVE THE BATH BLANKET.



FIG. 186.—TURN THE PATIENT ON HIS SIDE AND FOLD BACK THE TOP BLANKET.



FIG. 187.—ROLL BACK THE BLANKET FROM BENEATH THE PATIENT.



FIG. 188.—ROLL THE PATIENT TOWARD YOU AND REMOVE THE BLANKET WHICH WAS UNDERNEATH.





FIG. 189.—TURN THE PATIENT AND ROLL THE UNDER COVERS AGAINST HIS BACK.



FIG. 190.—BRUSH THE MATTRESS.



FIG. 191.—REPLACE THE MATTRESS PAD AND STRETCH IT SMOOTH TO AVOID WRINKLES.



FIG. 192.—BRUSH THE MATTRESS PAD.



FIG. 193.—DRAW THE SHEET TIGHT.



FIG. 194.—BRUSH THE SHEET.



FIG. 195.—REPLACE THE RUBBER SHEET.



FIG. 196.—DRAW THE RUBBER SHEET TIGHT.



FIG. 197.—BRUSH THE RUBBER SHEET.



FIG. 198.—UNROLL THE DRAWSHEET.





FIG. 199.—DRAW THE DRAWSHEET TIGHT.



FIG. 200.—BRUSH THE DRAWSHEET.





FIG. 201.—SPREAD THE CLEAN UPPER SHEET.



FIG. 202.—REMOVE THE DRY BATH BLANKET FROM UNDERNEATH THE CLEAN SHEET.



FIG. 203.—THE UPPER BLANKET IN PLACE AND TUCKED IN.



FIG. 204.—DRAW THE PATIENT'S HAND INTO THE SLEEVE OF THE CLEAN NIGHTGOWN.



FIG. 205.—DRAW ON THE SLEEVE AND PUT ON THE GOWN.



FIG. 206.—COMB THE PATIENT'S HAIR.



FIG. 207.—PUT ON THE SPREAD AND REPLACE THE PILLOW, THUS COMPLETING THE MORNING BATH AND BEDMAKING.

#### THE SLUSH BATH



FIG. 208.—Articles required: Two blanket rolls, each roll consisting of two blankets, to form the sides of the tub (when in place, the rolls are tied with a bandage at each end and in the middle to prevent unrolling; see Fig. 211); two flannel blankets; two sheets; one large rubber sheet; towels pitcher; bath pan or bowl; foot tub; ice cap; bandages; bed elevators.



FIG. 209.—Upper bedding removed, patient covered with bath blanket and rolled to side of bed. Rolled at the patient's back are first a blanket, next, the rubber sheet, and over this a sheet.



FIG. 210.—The bedding to protect the mattress unrolled close to the patient. The latter will now be rolled toward the opposite side of the bed to permit the nurse to unroll the protective covers in one movement.



FIG. 211.—The blanket, rubber sheet, and sheet have been folded over the patient, who has been turned back to the center of the bed, and the blanket rolls have been placed at the patient's sides and tied with bandages to hold the rolls in place.





FIG. 212.—The rubber sheet, blanket, and sheet have been unfolded and carried over the roll on each side, forming a trough in which the patient lies. A pillow has been placed under the patient's head, protected by rubber sheeting, and the head of the bed has been elevated. An ice cap and cold compress are at the patient's head, and a hot-water bottle at his feet. Cold compresses are in place in the axillæ.



FIG. 213.—The nurse is pinning the edges of the rubber sheeting together to form an outlet through which the water may flow.



FIG. 214.—To begin the bath, the nurse soaks a sea sponge or large bath cloth in the bath water.



FIG. 215.—In giving the bath, the nurse flows or slushes water over the entire body, allowing the water to fall from a height of 10 to 14 inches above the body surface, over all parts of which she continues to slowly carry the sponge.



FIG. 216.—After continuing the bath the time prescribed, the sheet, rubber sheet, rolls, and blanket are removed and the patient is wrapped in the bath blanket which was underneath. The ice cap and hot-water bottle remain in place. The under sheet has not been disturbed or saturated in giving the bath.

#### TUB BATH IN BED



FIG. 217.—The nurse is unrolling the flannel blanket, rubber sheet, and sheet which had been placed at the patient's back as shown in Fig. 209 of the Slush Bath.



FIG. 218.—The patient has been rolled to the center of the bed, and the blanket, rubber sheet, and sheet thrown over him, while the rolls have been placed at the sides of the bed. These rolls are kept in position by bandages carried both under the patient and under the bed.



FIG. 219.—Side view of the improvised tub. An ice cap and a cold compress have been placed at the patient's head, and cold compresses in the axillæ. The sheet between the patient and the rubber sheet is tucked in between the sides of the patient and the rolls which constitute the sides of the tub.





FIG. 220.—The tub has been completed, the head being formed by pillows and the foot by a third blanket roll, and all covered by a rubber sheet. The result is a complete tub capable of holding 8 to 10 inches of water.



FIG. 221.—While water is being poured over the patient an assistant maintains constant stroking over the surface of the body.



FIG. 222.—The water may be poured from a pitcher instead of using a bath sponge or a cloth.



FIG. 223.—After filling the tub to the point of safety, the patient is rubbed during the period for which the bath has been prescribed

At the completion of the bath, the tub is drained from the foot as in the slush bath, the sheet, rubber sheet, rolls, and blanket are removed, and the patient wrapped as shown in Fig. 216 on page 248.

## HYPODERMOCLYSIS



FIG. 224.—SUPPLIES REQUIRED FOR HYPODERMOCLYSIS ARRANGED WITHIN EASY REACH OF THE OPERATOR.

The articles are as follows: Two sterile enameled pitchers in sterile containers; two flasks of saline solution; tincture of iodine; bath thermometer in sterile solution; two sterile basins, one over the other, containing rubber tubing, needles, and flask cork and bulb; saline graduate (sterile) in sterile container; one package of sterile towels; one package of sterile gauze; alcohol; bichlorid, 1-1000; green soap; collodion.



FIG. 225.—THE SUPPLIES WITH COVERS REMOVED, OPEN AND READY FOR USE.



FIG. 226.—THE FIELD OF OPERATION EXPOSED, SHOWING ARRANGEMENT OF NIGHTGOWN AND BEDDING.



FIG. 227.—SCRUBBED-UP NURSE TAKING STERILE TOWELS FROM PACKAGE WHICH IS BEING HANDED HER BY THE UNSCRUBBED NURSE.



FIG. 228.—UNSCRUBBED NURSE POURING STERILE WATER AND GREEN SOAP ON STERILE GAUZE, WITH WHICH THE STERILE NURSE IS TO SCRUB THE SITE OF THE NEEDLE INSERTION.



FIG. 229.—STERILE NURSE SCRUBBING SITE OF INJECTION.





FIG. 230.—UNSCRUBBED NURSE POURING BICHLORID ON STERILE GAUZE FOR SECOND STEP OF STERILIZING THE FIELD.



FIG. 231.—CLEANSING THE SITE WITH ALCOHOL TO COMPLETE STERILIZATION OF THE FIELD.





FIG. 232.—ASSISTING NURSE POURING IODIN UPON GAUZE WITH WHICH THE SURGEON WILL COMPLETE THE STERILIZATION OF THE FIELD.

Some operators use iodine only and omit the alcohol and bichlorid.



FIG. 233.—APPLICATION OF IODIN BY SURGEON TO THE SITE OF INJECTION.



FIG. 234.—THE SITE OF THE INJECTION COVERED WITH STERILE GAUZE AND THE CHEST DRAPED WITH STERILE TOWELS.



FIG. 235.—STERILE NURSE TAKING THE GRADUATE CONTAINER FROM ITS WRAPPING WHICH IS HELD BY THE ASSISTING NURSE.



FIG. 236.—STERILE NURSE REMOVING THE STERILIZED RUBBER TUBING, BULB, AND NEEDLES FROM THE STERILE BASIN IN WHICH THEY HAVE BEEN STERILIZED.



FIG. 237.—STERILE NURSE ATTACHING THE STERILE RUBBER TUBING TO THE SALINE GRADUATE.

The tubing has been placed upon the sterile drape towel. The assisting nurse has the pitcher of sterile saline solution ready to pour into the saline graduate. The saline solution should be  $110^{\circ}$  when poured into the saline graduate. Before injected it will have cooled several degrees.



FIG. 238.—STERILE NURSE PLACING THE STOPPER AND BULB IN THE SALINE GRADUATE THAT HAS BEEN FILLED WITH THE SALINE SOLUTION.  
The tube is clamped to prevent flow of the solution.

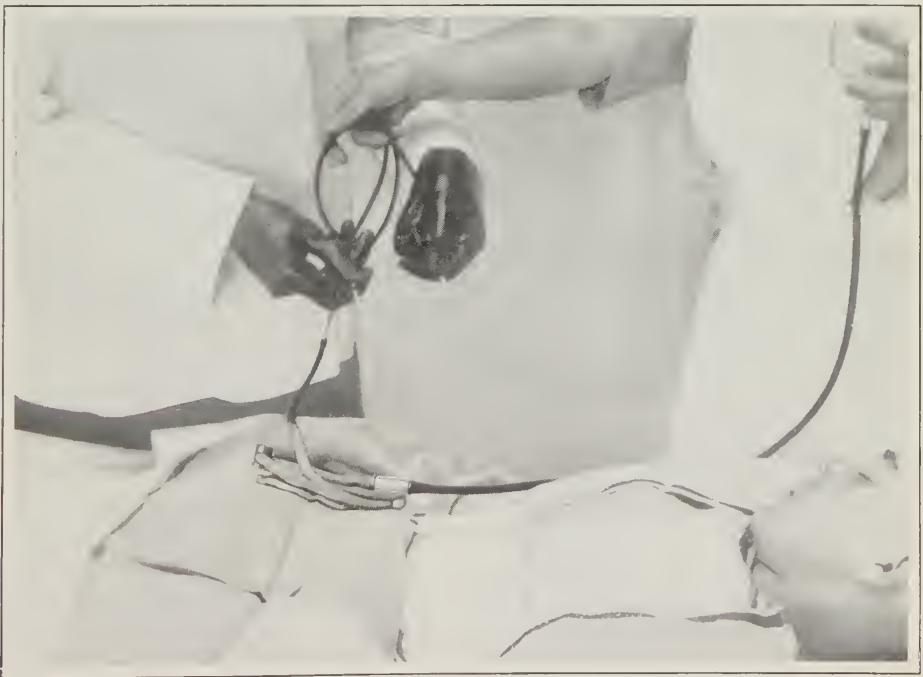


FIG. 239.—STERILE NURSE HANDING THE TUBES AND NEEDLES TO THE SURGEON.  
By this method neither the nurse nor surgeon touches the needles.



FIG. 240.—STERILE NURSE REMOVING THE STERILE GAUZE FROM THE CLEANSED SITE OF THE INJECTION, AND THE SURGEON READY TO INSERT THE NEEDLES.



FIG. 241.—INJECTION OF THE SALINE SOLUTION.

The nurse is gradually forcing the saline out of the graduate by compressing the bulb. From 400 to 800 cc. may be injected during a single procedure. During the injection the fluid is disseminated under the breast by gentle rotary massage.





FIG. 242.—THE INJECTION COMPLETED.

The assisting nurse is pouring collodion on two pledgets of sterile cotton held by the sterile nurse to seal the punctures made by the needles.



FIG. 243 —APPLICATION OF PLEDGETS OF COTTON SATURATED WITH COLLODION OVER THE PUNCTURE SITES BEFORE WITHDRAWING THE NEEDLES.



## THE TECHNIC OF THYROIDECTOMY



FIG. 244. PATIENT ON OPERATING TABLE. ANESTHETIC COMMENCED. FIELD DRAPED WITH STERILIZED TOWELS PREPARATORY TO STERILIZATION OF THE SITE.

Note nurse ready to paint the field with benzin-iodin solution. She holds two sterile sponges, rolled, and a small cup of the solution in her left hand. Observe the method of draping towels around the field of operation. Notice that the patient's hair is covered with a rubber cap.



FIG. 245.—NURSE STERILIZING THE FIELD OF OPERATION WITH BENZIN-IODIN SOLUTION.

The prepared area extends from the chin and jaw to three inches below the clavicle and well back of the shoulders. Note approved operating uniform and headgear worn by the surgical nurse.



FIG. 246.—READY FOR THE OPERATION.

Sterile sheets and towels are held in place with towel clamps.



FIG. 247.—FIRST INCISION THROUGH THE SKIN.

Artery forceps clamped on a superficial blood vessel. This view shows the complete isolation of the anesthetist and the patient's face from the operative wound by the sterile screen.



FIG. 248.—DELIVERING THE RIGHT LOBE OF THE THYROID.

Although thyroidectomy is a bloody operation, it will be observed that loss of blood has been controlled by prompt hemostasis and the draped field thus far kept clean. The assistant is ready with opened artery forceps to immediately clamp a "bleeder" and is sponging with his left hand.



FIG. 249.—LOBE OF GLAND REMOVED.

Note the large number of artery snaps necessary to control the hemorrhage.



FIG. 250.—THE INCISION HAS BEEN SUTURED WITH A SUBCUTANEOUS SUTURE AND IS READY FOR THE DRESSING.



FIG. 251.—THE FIRST DRESSING IN PLACE.

Observe that the field is kept clean by replacing the soiled towels with sterile ones.



FIG. 252.—GAUZE DRESSINGS IN PLACE, READY TO BE COVERED WITH STERILE COTTON.  
Note the abundance of dressings employed.



FIG. 253.—GAUZE DRESSINGS COVERED WITH STERILE COTTON.  
The wound dressing is now ready for the bandage.





FIG. 254.—DRESSING COMPLETED.

The roller bandage over the cotton and gauze dressings is carried around the neck, under the arms, and around the chest.



FIG. 255.—ADMINISTRATION OF OXYGEN DURING THE OPERATION.





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